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BIOLOGICAL ASPECTS OF LEAD:

AN ANNOTATED BIBLIOGRAPHY

PART 2

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Literature from 1950 through 1964

PART II

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B. CHILDREN

1950

2850 Binder, I. (Women's Homeopathic Hosp., Philadelphia, Pa.): LEAD ENCEPHALOPATHY: TREATMENT AND RECOVERY. REPORT OF CASE. Archives of Pediatrics 67:51-5 (Feb.), 1950.

A case of Pb poisoning is presented in a 3-yr-old boy who was admitted to the hospital in a comatose condition, with subsequent convulsions. The diagnosis was obscure until basophilic stippling of the erythrocytes. the Pb line in the long bones, as seen in X-ray studies, were noted. The patient was treated by administration of Ca gluconate and vitamins C and D in order to promote storage of Pb in bones. The child was discharged in good physical condition 45 days after admission to the hospital.

2851 Calvo Melandro, J.: Intoxicaciones accidentales per plomo. (ACCIDENTAL INTOXICATIONS BY LEAD.) Revista Clinica Espanola 38, No. 5:369-9, 1950.

Thirty-eight cases of Pb poisoning treated by BAL are presented. The intoxications were caused by products having a Pb arsenate base. All the classical symptoms described until the present time were seen. The author emphasizes the radiologic aspect of the bones in the course of the intoxication: the phenomena resemble those described recently by R. Clement and his coworkers in nursing infants fed by syphilitic nurses treated with Bi injections although the opacities were less dense and less precise. In discussing BAL therapy in Pb poisoning, the author refers to the work by Hesse in 1940 who believed that an antidote for Pb should be a substance which would cause the elimination of the poison by transforming it into nontoxic salts. This work was carried out with aromatic compounds containing phenyl hydroxyl groups. (From Archives des Maladies Professionnelles de Médecine du Travail et de Sécurité Sociale 12:90, 1951)

2852 Ennis, J.M., and Harrison, H.E. (Baltimore City Hosp.; Johns Hopkins Univ. Med. School, Md.): TREATMENT OF LEAD ENCEPHALOPATHY WITH BAL (2.3-DIMERCAPTOPROPANOL). Pediatrics 5:853-68 (May), 1950.

Sixteen children with Pb encephalopathy admitted and treated with BAL in the past 3 yr were divided into 2 categories according to the degree of severity of illness. The criteria were repeated convulsions which were difficult to control, stupor or coma which persisted for longer than would be consistent with the usual postconvulsive state, ie, >12 hr, for severe category. Using these criteria 9 were severe and 7 mild. For control, 31 children treated between 1943-1947 (with citrates and phosphates) were used; in this group there were 18 severe and 13 mild cases.

BAL was injected im as a 10% solution in benzyl benzoate in oil at a dose of 2 mg/kg every 4 hr for 4 injections, and the dosage was increased to 3 and later to 4 mg/kg/injection every 4 hr for 10 days. Several cases received shorter courses of treatment. No severe toxic effects were noted at this dosage. Some postinjection vomiting was seen but it was not severe enough to cause discontinuance of the therapy. The mortality rates and evidences of permanent nervous system injury in the BAL group were 2 deaths out of 9 severe cases against 12 out of 18 in the control group and neurologic residua in total of 6 and 13, respectively. Blood Pb concentration fell in each case irrespective of treatment and was not influenced by BAL administration. Urinary excretion checked coincidently with blood levels generally showed increase at first but in some cases returned to normal (pretreatment levels) during the treatment.

The authors conclude that although BAL is apparently effective in lowering the mortality rate in children with severe Pb encephalopathy, no conclusive effects of therapy could be demonstrated in subacute or mild cases. (15 references)

2853 Saenger, S.: Sakana shel har'alat oferet etsel tinokot. (THE DANGER OF LEAD POISONING IN INFANTS.) Dapim R'fujim (Tel-Aviv) 9, No. 1:63, 1950.

The case of an infant is reported who was breast fed for 3 mo and started suffering in his 5th mo from unexplainable diarrhea and anemia. After cessation of diarrhea the anemia continued uninfluenced by treatment. At the age of 13 mo Pb poisoning was suspected. Although there was no stippling of red blood cells and no increase of Pb in the urine, a diagnosis of Pb poisoning was reached on account of X-ray findings in the long bones. It could be proved that the baby's mother had used a Pb-containing ointment against cracks in her nipples at the time of breast feeding.

Another case is mentioned of acute Pb poisoning from use of a Pb nipple-cap. The author warns against the use of Pb-containing ointments as well as Pb nipple-caps in the treatment of cracked nipples. (From Biological Abstracts 26:15257, 1952)

1951

2854 Anonymous: BALTIMORE PASSES REGULATION BARRING USE OF PAINT CONTAINING LEAD FOR INTERIORS OF HOUSES. Industrial Health Monthly 11:171 (Nov.), 1951.

Because 83 children have died of Pb poisoning in the last 20 yr, Baltimore has passed a new housing regulation barring the use of paint containing Pb pigment for use in the interior painting of any dwelling or dwelling unit or any part thereof. From Jan. 1, 1931, to June 30, 1951, a total of 293 cases of Pb poisoning was reported. Of these, 83 died. The majority of the cases occurred in the summer months, July and August. While most of the children were in their 2nd yr of life and so of teething age, the reporting of most of the cases in the 2 hot summer months is as yet not easily explained. Usually children lived in old rented properties where Pb paint had been used for many years on window sills and frames where it had often flaked and scaled. Investigations made by the nurse assigned to the Bureau of Industrial Hygiene most often revealed that the children chewed the window sills or picked up the paint flakes and put them in their mouths. Of the 293 cases, 93 were white and 200 colored, 157 were male and 136 female. By ages, 19 were <1 yr old, 167 were in their 2nd yr, 67 in the 3rd, 21 in the 4th, 11 in the 5th, and 8 were >5 yr of age. Repeated warnings about this child health hazard have been given by the Baltimore City Health Department in the press, by radio and television, and in other ways, but more cases are being discovered as the years go by. Because of this, the new regulation was adopted by the Commissioner of Health on June 29, 1951. According to Baltimore's "The Evening Sun," for August 8, 1951, a landlord was fined in Housing Court "for failing to remove from window sills Pb paint which, according to testimony, had kept a 4-yr-old boy in Johns Hopkins Hospital since June 21." Dr. Wilmer H. Schulze of the City Health Department said that up to Aug. 29 Baltimore has had 44 cases of Pb poisoning in children this year "practically all in old houses in the lower income group." Eight of the children died. Physicians and hospital authorities are assisting in this battle for prevention and the public health nurses and housing inspectors do likewise as they make their home visits. A most important element is the specially equipped blood Pb laboratory service which was 1st established in the Baltimore City Health Department in July 1935.

2855 Burrows, N.F.E., Rendle-Short, J., and Hanna, D. (Belgrave Hosp. for Children: Hosp. for Sick Children, Gr. Ormond St., London, England): LEAD-POISONING IN CHILDREN. REPORT OF FIVE CASES, WITH SPECIAL REFERENCE TO PICA. British Medical Journal 1:329-34 (Feb. 17), 1951.

Of the 5 cases of Pb poisoning, 4 were associated with pica and 1 was caused by the use of a Pb nipple shield. The serious prognosis of the condition is stressed. One of the patients died and 2 appear to be mentally backward.

The sources of Pb in such cases can be broadly divided according to the ages of the patients. (1) In infancy, due to Pb nipple-shields or the use of Pb-containing powders, etc; (2) 1-5 yr, due to pica, eating Pb along with other noxious substances; most commonly this is in the form of Pb paint; and (3) schoolchildren, due to accidents similar to those met with in adult life.

The clinical features of Pb-poisoning are discussed. The manifestations in childhood differ from those in adults in that encephalopathy, with irritability, fits, and coma, is very common. Wrist-drop and the Pb line on the gums, however, are rare. The diagnosis is often first suspected from the finding of stippled erythrocytes (SE) in blood. Although not diagnostic, SE should lead to further investigations, of which X-ray examination of the long bones is the most important. The possible value of EEG recordings is discussed. EEG's were performed in 2 of the cases. In discussing some of the findings, the authors state that glycosuria was observed in 2 cases, which as suggested by Goettsch and Mason (1940) may be pancreatic or cerebral in origin associated with hyperglycemia, or renal associated with a normal or low blood sugar, with evidence pointing to the latter. Necropsy of the fatal case showed cause of death to have been hemorrhage from acute ulceration of the esophagus. The brain showed slight cellular infiltration of pia arachnoid with perivascular edema; there was no evidence of encephalitis or vascular lesion. Liver had undergone fatty change with many hepatic cell nuclei showing eosinophilic acid-fast inclusions. In the kidney, the most pronounced degenerative changes in the cortex were acidophilic; acid-fast nuclear inclusions were numerous. Pb content in blood was 0.03 μg/100 ml; bone Pb, 89 ppm; liver, 53 ppm. In the survivors, blood Pb was determined in 3 cases: blood, 0.3 μg/100 ml (normal 0.01-0.03); urine, 0.285 mg/24 hr (normal not >0.2). Psychologic reports indicated considerable difficulty with all items involving visual-motor coordination, and low average intelligence.

Treatment should aim at immobilizing the Pb in the bones. "De-leading" should never be attempted in children.

Pb poisoning in children could be entirely prevented. Pb paint should never be used in places that children can reach. Pb nipple-shields should be prohibited.

The use of dimercaprol in the treatment of Pb poisoning is discussed and is thought to be worthy of trial, especially in cases of Pb encephalopathy. (30 references)

2856 Queries and Minor Notes: LEAD POISONING FROM BITING FURNITURE. Journal of the

American Medical Association 145:531, 1951.

The answer to the query posed was that at present the incidence of Pb poisoning among children from their gnawing on baseboards, furniture or toys is low. At present few coating materials for interiors and furniture contain Pb, for economic reasons. Lithopone and titanium dioxide have largely replaced Pb compounds. Some Pb may appear in the pigments, such as the greens and oranges. No substantial toy manufacturer now uses Pb paints. Synthetic dyes have widely displaced mineral pigments, although traces of Pb may be present in quick-drying agents. No specific federal laws have been enacted with respect to Pb in these paints. The matter chiefly has been solved on the basis of intelligent understanding and good faith on the part of manufacturers. Some difficulty still arises from the well meaning neighborhood friend of children who repaints old toys, using whatever paint is on hand. Some of the aniline dyes employed on toys are theoretically capable of inducing methemoglobinemia but the quantity involved is less than in crayons.

2857 Ross, J.R., and Brown, A. (Toronto, Canada): POISONINGS COMMON IN CHILDREN. Canadian Medical Association Journal 64: 285-93, 1951.

The cases of poisoning admitted to the Hospital for Sick Children, Toronto, over a 10-yr period are presented. Many drugs and chemical irritants were responsible for the poisoning: 14% of the cases resulted fatally.

Poisonings due to Pb appeared to be more common and also more fatal than any other single group. In a summary made 4 yr ago, 23 cases of Pb poisoning were treated at the Toronto Hospital for Sick Children during a 2-yr period. Of these 23 cases, 10 had cerebral symptoms on admission and 5 of these died. One case resulted in cerebral sclerosis with mental retardation. The remaining 13 cases were of latent Pb poisoning. It usually requires from 2-4 mo or longer of nibbling paint before any acute symptoms arise. During this period the child will become cross and there may be complaints of abdominal pain. Anorexia soon develops and this is usually associated with constipation and occasional vomiting. The Pb symptoms are characterized by the onset of convulsions. In the latent cases in addition to the finding of stippled cells a dense white line may be seen at the epiphyseal ends of the long bone on X-ray examination if the infant has been ingesting Pb for a period of a month or more. Confirmatory evidence of this type of poisoning is the recovery of Pb from the urine in a concentration >5 ug/100 ml. A child who has a natural tendency to pica may ingest sufficient Pb from many different sources to cause symptoms. Pb from repainted cots and cribs, play pens, furniture, etc, may have a cumulative effect in the body due to the fact that it is normally excreted very slowly. The poisoning occurs in the large majority of cases between 1 and 2-1/2 yr of age or during the "teething period." Cases which are recognized before the onset of convulsions are treated by the administration of fairly large doses of Ca either in the form of lactate or phosphate together with vitamin D to increase the absorption of Ca. Treatment of cases which have convulsions as the result of a cerebral edema is first directed toward decreasing the cerebral edema by the sc injection of 10-20 ml of Mg sulfate in 8% solution or 20-30 ml of 50% glucose iv. Pb poisoning is a preventable disease in children and Pb-containing paints are the chief source of poisoning. In order to adequately prevent this condition, the elimination of these paints from the immediate environment of the child during the 2nd and 3rd yr of life is essential. Pb-free paints are readily available. The principal hazard occurs from repainted furniture in the poorer class homes. A fatal case of Pb poisoning was found to have ingested <2/3 g of metallic Pb.

2858 Wilzbach, C.A. (Cincinnati Health Dept., O.): LEAD POISONING IN CHILDREN. Cincinnati Journal of Medicine 32:315, 1951.

There seemed to be a sudden increase in Pb poisoning in children in recent months. Five diagnosed cases in addition to suspicious cases were reported to the Cincinnati Health Department since January 1, with 2 deaths reported this year and 1 additional death occurred that was suspected as being due to Pb poisoning. In 1950 3 children died from this cause. A study of the records for the past 10 yr shows an average of 1 death/yr.

There seems to be evidence that Pb is now being used more frequently in paint, however, in most cases it is the home repaint job that causes the trouble. It is generally known that children chew painted surfaces, woodwork, window sills, cribs, high chairs, other furniture, and toys. In most instances children's furniture and toys are finished with non-Pb paint when purchased.

Pb poisoning is a definite health hazard in young children and physicans should be alert to its presence. When discovered early, serious illness can be prevented. The symptoms may be mild for several weeks or months, consisting only of headache, loss of appetite and anemia. Other symptoms may include pains in the abdomen, nausea, vomiting, persistent constipation and convulsions.

A recent study of 220 cases completed by the Baltimore Health Department shows the following age distribution: <1 yr, 1; 1 yr, 37; 2 yr, 121; 3 yr, 32; 4 yr, 13; 5 yr, 8; 6 yr, 4; 7 yr, 2; 8 yr and 10 yr, 1 each. Of the 220 cases, 78 resulted in deaths.

1952

2859 Agerty, H.A. (Hahnemann Med. Coll., Philadelphia, Pa.): LEAD POISONING IN CHIL-

DREN. Medical Clinics of North America 36:1587-97 (Nov.), 1952.

Pb poisoning is still a pressing problem in the practice of pediatrics, especially among young children living in a poor tenement environment. Chewing on furniture, toys or woodwork painted with Pb-containing paint is the chief source of this poison. Some of the ingested Pb reaches the circulation and is then carried to many parts of the body. Pb deposition in long bones gives characteristic lines. In the brain, encephalitis may ensue. The symptoms are at first insidious. Convulsions and anemia with stippled red cells are common. Quantitative blood and urine studies help to make the diagnosis. The prognosis is serious, since there is an appreciable mortality (20-30% in some series), and permanent brain damage is frequent in those surviving. The treatment is not too satisfactory. Na citrate has been used in recent years with some success. Supportive therapy is in order, chiefly anticonvulsive measures and blood transfusions. Recently EDTA has been introduced. Further evaluation is needed, but it appears promising. A series of 12 cases observed in the Hahnemann Hospital were reviewed. The findings were quite typical. (17 references)

2860 Anonymous: CHILDREN OF STORAGE BATTERY MAKERS IN PHILIPPINES CONTRACT LEAD POISONING. Occupational Health 12:71 (May), 1952.

It is reported that several cases of Pb poisoning among children of storage battery makers have occurred in the Philippines recently. The families live in close proximity to the workshop and the young children through ignorance or neglect of the parents are allowed to play or eat near the place of work and were thereby exposed to Pb dust and fume. Three cases of which 2 were fatal are described as an illustration of this occurrence. A study of Pb poisoning among the workers in the manufacture of Pb seals, bars, washers, and storage batteries in Manilla showed high concentrations of Pb at the breathing level of the workers. The physical, urine, and blood examinations also showed chronic Pb poisoning, however no cases of acute.

2861 Bessman, S.P., Ried, H., and Rubin, M. (George Washington Univ. School Med.; Children's Hosp.; Georgetown Univ. School Med., Washington, D.C.): TREATMENT OF LEAD ENCEPHALOPATHY WITH CALCIUM DISODIUM VERSENATE. REPORT OF A CASE. Medical Annals of the District of Columbia 21:312-5 (June), 1952.

Pb poisoning from the ingestion of paint from woodwork in a 3-yr-old boy was diagnosed on the basis of history, X-ray films of long bones and the presence of Pb in blood and urine. On the 9th day of hospitalization he was given 50 mg $CaNa_2EDTA$ iv, in 50 ml of 5% glucose solution. This dose was repeated 5 days later and for 2 additional doses at 8-hr intervals. It was then doubled, and increased daily in 150 mg/day increments until the dosage on the 20th hospital day was 750 mg/day in 3 divided doses. Therapy was discontinued after 12 days because of marked improvement in the patient's condition. A total of 6.5 g $CaNa_2EDTA$ had been given. None of the symptoms during the child's illness were referable to EDTA. A slight rise in the blood nonprotein N suggests that EDTA competes with nitrogenous wastes for excretion.

2862 Galbreath, M. (Baltimore City Health Dept., Md.): LEAD POISONING IN YOUNG CHILDREN; THE ROLE OF THE PUBLIC HEALTH NURSE. Public Health Nursing 44:551-2 (Oct.), 1952.

Since 1931 the Baltimore City Health Department has recorded 350 cases of Pb poisoning in young children. The ratio of cases and deaths between white and Negro children was 1:2; 107 cases and 31 deaths among white children and 243 cases and 60 deaths among Negro children. About 58% of the children (204) ~~were in~~ the 12-24 mo age group (the teething age). In 1951, when Pb poisoning was the 3rd ranking cause of death in the 1-4 yr age group in Baltimore, 77 cases were reported. Nine of the children died and 22 showed evidence of encephalitis. Only pneumonia and tuberculosis killed more children in that age group that year. The Health Department's plan of attack has developed along 2 lines: (1) Home investigation and law enforcement; (2) education and publicity, stressing prevention. For some years home visits have been made to all reported cases to find out the child's condition and also to ascertain the likely source of the material ingested. The ingestion of Pb pigment paint has been found to be the causative agent. Under the Baltimore Ordinance on the Hygiene of Housing the presence of paint containing Pb pigment is interpreted as being a health hazard, and the elimination of the source of danger, when not done willingly, can be enforced. In June 1951 the Health Department adopted a new regulation specifying that the painting of interior surfaces must be done with paint free of Pb pigment. Pb poisoning is chiefly a disease of the slums where bad housing conditions are prevalent. In the education and publicity campaign, newspaper releases and radio shows, pamphlets, and talks to interested community groups are employed. Sanitarians, assigned to housing and rodent control, are particularly alert to the dangers of flaking paint on their inspections and to the need to have such conditions corrected. Pb poisoning in children has been stressed in the educational programs of the public health nursing staff and affiliating student nurses. The nurse in a generalized public health nursing service has excellent opportunities for casefinding and preventive work in the area of Pb poisoning. By observing the condition of a child in a well baby clinic or during a home visit and by inquiring into a possible history of paint chewing or eating, she can make a splendid contribution in cutting down the incidence of Pb poisoning in young children. It is particularly important that a nurse consider the possibility of Pb ingestion when a child shows some of the more common symptoms of Pb poisoning such as pallor, irritability, vomiting, loss of appetite, and cramps, in addition to pica. On visits to the home where there are small children the public health nurse can well include the prevention of Pb poisoning as part of her home safety supervision.

2863 Giannattasio, R.C., Bedo, A.V., and Pirozzi, M.J. (Kings County Hosp., Brooklyn, N.Y.): LEAD POISONING. OBSERVATIONS IN FOURTEEN CASES. A.M.A. American Journal of Diseases of Children 84:316-21 (Sept.), 1952.

Fourteen cases of chronic Pb intoxication are presented, 12 of which occurred from June-Sept. 1951. In 10 of the 14 cases there was definite evidence of encephalopathy. In 2 cases tuberculosis meningitis coexisted, and the presence of Pb encephalopathy could not be ascertained with certainty. The signs and symptoms, diagnosis, treatment and prognosis are tabulated and briefly discussed. (From authors' summary)

2864 Giannattasio, R.C., Pirozzi, M.J., Bedo, A.V., and Jennings, K.G. (Kings County Hosp., Brooklyn, N.Y.): BAL THERAPY IN CHRONIC LEAD POISONING. Pediatrics 10: 603-11, 1952.

Three cases of chronic Pb intoxication were presented which were treated with BAL in a dose of 4 mg/kg body weight every 4 hr for 20 days. Cessation of symptoms was noted in every case. Resting urinary Pb levels were increased 3- to 7-fold without exacerbation of symptoms. BAL was found to be nontoxic in the dose used and acted as an effective deleading agent. The authors feel that this form of treatment merits use in both the chronic and acute phases of Pb intoxication. These 3 cases were part of the group of 14 reported in the preceding abstract. (23 references)

2865 Hesselvik, L., and Nordbring, F. (Children's Clinic, Acad. Hosp., Uppsala, Sweden): Blyförgiftning hos bröstbarn. (LEAD POISONING IN BREAST-FED INFANTS.) Svenska Läkartidningen 49:2130-2 (Aug. 22), 1952.

A 3-mo-old infant was hospitalized because of unusual listlessness, vomiting and convulsions, culminating in coma after admission, apathy and paleness having begun 1 mo before. Findings included severe normochromic anemia (Hb 40%), pronounced increase in reticulocytes, 62/1000 stippled erythrocytes, typical Pb lines in all long bones upon X ray, increased CP in urine and urinary Pb (while under BAL treatment) of 0.94 mg/l. The EEG taken on the 1st day, before BAL was started, showed severe pathologic signs, especially in the upper parietal region. Although the child improved under BAL therapy to the extent that clinically no brain damage could be observed, the EEG's taken 2, 4, and 12 wk after admission were still pathologic. The source of the poisoning was attributed to the mother's use of diachylon salve (Pb oleate), prescribed by a physician ∼6 wk before the child was admitted, for painful sores on the nipples with instructions to use the salve (15-25 g) only by alternating it with Zn paste and to wash the breast carefully before nursing. The mother felt that the diachylon salve was the better one, so she used it exclusively 4 times daily for at least 1 mo. Before nursing she washed the breast carefully with gasoline, then soap and water. The author concludes that this had not prevented the absorption of Pb, with the consequences described above.

2866 Millichap, J.G., Llewellin, K.R., and Roxburgh, R.C. (St. Bartholomew's Hosp., London, England): LEAD PAINT: A HAZARD TO CHILDREN. Lancet 2:360-2 (Aug. 23), 1952.

The commonest cause of Pb poisoning in children in Britain is ingestion of paint on woodwork in the home, particularly on cots. The authors describe 5 cases of Pb poisoning (aged 3 yr or less), 4 of which arose from the father's use of Pb paint for renovating the cot. These 5 cases bring the number of reports published in England during the past 60 yr to 19, the source of Pb being: painted woodwork (9), nipple shields (4), toy soldiers (2), fumes from burning battery casings (2), drinking water (1) and toilet powder (1).

The 1st patient presented with, apart from other signs and symptoms, diaphragmatic paralysis, muscle pain and tenderness of the abdomen to palpation, and bilateral foot drop 8 days after admission to the hospital. Stippled erythrocytes led to the diagnosis of Pb poisoning, confirmed by history of ingestion of Pb from the cot, raised blood and urinary Pb, radiographic evidences of Pb in the bones. Recovery from polyneuritis, including diaphragmatic paralysis, was complete after 3 wk.

Radiographic appearances consistent with the diagnosis of Pb poisoning were present in all 5 cases, with dense lines at the angles of the scapulae (2 cases). Increase of stippled cells was minimal in 1 case and absent in 2 cases. Encephalopathy was present without fits in 2 patients, while another was admitted with convulsions, which continued as status epilepticus for 24 hr despite repeated im injections of paraldehyde.

Treatment generally was by Ca lactate or gluconate, vitamin D, blood transfusions, milk or high Ca diet.

All 5 patients recovered.

Pica, a common prelude to Pb poisoning, was exhibited by all 5 patients. Patient 2 (twin sister of patient 1) had no history of illness but was admitted owing to the family history, thereby avoiding much delay in necessary treatment. Many similar cryptic cases of Pb poisoning probably exist and it is emphasized that the paucity of published reports does not reflect the potential danger to children of paint containing Pb. Serious complications such as encephalopathy can be averted only by early diagnosis and removal of source of Pb, and by education of the general public to this hazard.

2867 Williams, H., Kaplan, E., Couchman, C.E., and Sayers, R.R. (Baltimore City Health Dept., Md.): LEAD POISONING IN YOUNG CHILDREN. Public Health Reports 67:230-6 (Mar.), 1952.

As reviewed by the authors, chewing of paint from cribs, toys, furniture, and window sills, and eating of painted plaster and fallen paint flakes cause Pb poisoning in childhood. Putting things in the mouth, though normal in the 1st yr of life, is abnormal, if continued much later and is referred to as pica, or perverted appetite. Children of teething age living in old, run-down houses where Pb paint has been used for years are especially likely to have Pb poisoning. Although pica does not exist on a seasonal basis, a striking number of Pb poisoning cases resulting from this habit occur in the hot summer months. Though no explanation for this phenomenon has been given yet, it has been mentioned by several investigators. Weeks or months following repeated ingestion of small amounts of Pb there may appear irritability, fretfulness or disturbed gastrointestinal function, such as lack of appetite, constipation, vomiting or cramps; there may also be pallor as the result of secondary anemia. More severe intoxication results in Pb encephalitis, which may terminate in death. Central nervous system involvement or encephalopathy rarely seen in adults with Pb poisoning, is common in children, whereas peripheral neuritis, a Pb line on the gums, and colic are usually absent in children. A history of pica and examination of blood smears for stippling of the red blood cells are important aids in diagnosis. Porphyrinuria is frequently found, and the demonstration by X ray of an increased density in the growing ends of the long bones is a cardinal sign of Pb poisoning. The quantitative determination of Pb in blood or urine is helpful in diagnosis.

The authors review the efforts made in their Department to diagnose and treat Pb poisoning in infants. Education of the public combined with "Pb consciousness" in physicians and pediatric clinics and with a blood-Pb laboratory service has resulted in a marked increase in case recognition. It is hoped that education and the enforcement of measures regulating the use of Pb-containing paints result in a material reduction and eventual elimination of Pb poisoning in children. (49 references)

2868 Zak, F.G., and Finkelstein, W.E. (Knickerbocker Hosp., New York, N.Y.): PLUMBISM IN CHILDREN. Journal of the Mount Sinai Hospital 19:352-8 (May-June), 1952.

A fatal case of Pb encephalopathy in a 33-mo-old Negro girl with pica is presented. The diagnosis was unsuspected clinically and based on the presence of acid-fast nuclear inclusion bodies in kidney and liver. Typical microscopic changes of the brain and a significant increase of Pb (0.15 mg/100 g; 0.09 mg considered to be the normal maximum) in this organ corroborated this. The differential diagnoses are discussed from the standpoints of the clinician and the pathologist. (13 references)

1953

2869 Bergstrom, R., Wolf, S.I., and Bessman, S.: LEAD ENCEPHALOPATHY COMPLICATED BY RESPIRATORY CENTER DEPRESSION. Special Report No. 275. Clinical Proceedings of the Children's Hospital of the District of Columbia 9:241-3, 1953.

A 2-yr-old Negro girl was admitted with convulsions that developed after anorexia and vomiting earlier the same day. There was no history of head injury, exposure to contagious diseases or drug ingestion. Past history revealed that the patient had frequently put objects into her mouth. Laboratory examinations upon admission showed the following blood picture: Hb, 2 g; erythrocytes, 2,700,000; leukocytes, 10,000; lymphocytes, 38; monocytes and stippled erythrocytes (SE), 1 each. X-ray studies of the lower extremities revealed increased densities at the metaphyses of the distal ends of both femora and of the distal and proximal ends of both tibiae and fibulae, which suggested Pb poisoning. This was confirmed by the finding of SE and the history of pica. A catheterized 12-hr urine showed Pb excretions consistent with a diagnosis of Pb poisoning. On the 5th day in hospital the patient became restless, lost appetite and seemed apathetic. Since her condition worsened she was given 1 g of $CaNa_2EDTA$ iv in 50 ml 5% glucose after 12-hr urine rather than after 24-hr urine; this was followed 90 min later by a severe generalized convulsion which was controlled by 2 grains of Na luminal and oxygen inhalation. Because respiration became soon shallow after this the respirations were stimulated by electrophrenic respirator for 15 min. Recurrence of respiratory problems necessitated the repeated use of the electrophrenic respirator and continued EDTA treatment with satisfactory results. The authors were convinced that the convulsions were not due to the therapy, and the continued administration of the EDTA was justified by the course of the patient. The data on the Pb content of blood and urine and the increased excretion by EDTA are reported elsewhere.

2870 Bruusgaard, A. (Oslo, Norway): LETTERS FROM THE READERS. LEAD POISONING. Occupational Health 13:80 (May), 1953.

The correspondent was interested in the article in the May 1952 issue of "Occupational Health," on Pb poisoning among children of storage battery makers. He wished to know about the exact values of the Pb content in urine in these cases and also about any other investigations on the normal Pb content in urine of children.

He had seen some cases of children living in the neighborhood of an electrochemical plant producing dust containing some few percent of Pb compounds. They showed a slight increase in the basophilic values and excreted ~50 μg Pb, and several of them showed a positive coproporphyrin test in urine. They had no clinical symptoms but he felt the findings indicated that they had been exposed to Pb. As both the basophilic values and the coproporphyrin test are not very specific, he wished to know more about urinary Pb values in children, before starting further investigations.

2871 Deane, G.E., Heldrich, F.J., Jr., and Bradley, J.E. (Univ. Maryland School Med., Baltimore): THE USE OF BAL IN THE TREATMENT OF ACUTE LEAD ENCEPHALOPATHY. Journal of Pediatrics 42:409-13 (Apr.), 1953.

A statistical survey is presented of 54 cases with acute Pb encephalopathy admitted to the University Hospital. The patients, ranging in age between 15-84 mo (mean 29.4 mo) were divided into 2 groups in order to evaluate the efficacy of BAL. The 1st group consisted of 38 cases which had occurred between 1931-48, ie, before BAL was used. Of these 10 died (26.31%); this compares favorably with McKhann and Vogt's finding of (1933) 25% mortality and Holt's (1923) 65%. The detailed complaints and physical findings of this group are presented in a table. Group 2 consisted of 16 cases which were treated from 1948-51 after the introduction of BAL. The mortality was 6.25% (1 patient).

The authors present a brief analysis of the clinical symptoms, signs, and laboratory data. Stress is placed on the importance of supportive measures in the management of acute Pb encephalopathy, especially the prevention of infection and acidosis. Because of the striking difference in the overall mortality in the 2 groups, further trials in the treatment of acute Pb encephalopathy with BAL are indicated.

2872 Giannattasio, R.C., and Pirozzi, M.J. (Kings County Hosp., Brooklyn, N.Y.): BAL THERAPY IN ACUTE LEAD ENCEPHALOPATHY. New York State Journal of Medicine 53:3017-8 (Dec. 15), 1953.

In the period from February 1951 to September 1952, 14 children, ranging in age from 18 mo-3 yr were admitted to a Brooklyn hospital with acute Pb encephalopathy. Six of these children were treated with dimercaprol (BAL), and the 8 others, who served as controls, were given a diet high in Ca and inorganic phosphate (1 qt of milk/day) and large doses of vitamin D. The diagnosis of Pb poisoning was based on a history of pica, characteristic signs and symptoms of Pb poisoning: basophilic stippling of the red blood cells increased density at the ends of the long bones, and an elevation of Pb in the urine >0.08 mg/l. When 1 or more of the following signs were present in a child with Pb poisoning, he was considered to have encephalopathy: convulsions, increased intracranial pressure, persistent vomiting, cranial nerve palsies, muscle weakness or paralysis, ataxia, drowsiness, tremors, and increased concentration of protein in the spinal fluid. Pb encephalopathy was considered severe if the patient had repeated convulsions or coma or stupor persisting for >14 hr. Three of the 8 cases in the control group were severe and 5 mild. In the BAL group 3 were severe and 3 mild. BAL was given in doses of 4 mg/kg of body weight every 4 hr for 10 days. In the noncomatose children treated with BAL, signs and symptoms subsided in 24-36 hr. The comatose children became alert in 24-72 hr, and in 1 of the 3 recovery was complete within this period. The other 2 had ptosis of the eyelid, which was transitory. In the noncomatose children of the control group the presenting symptoms persisted for from 3 days-1 wk. Coma or stupor lasted 3-5 days. One child died after 3 days in deep coma. The other 2 comatose patients retained severe neurological defects, hemiparesis, and blindness.

The authors conclude that BAL seems to lower mortality and decrease the severity of residuals in acute Pb encephalopathy. In proper dosage it appears to be a safe therapeutic agent.

2873 Kane, C.A., and Foley, J.M.: CLINICAL PATHOLOGICAL CONFERENCE. Neurology 3:68-73, 1953.

A fatal case of acute encephalopathy with meningeal reaction in the spinal fluid and anemia due to Pb poisoning in a 20-mo-old infant is reported. For 5 mo prior to illness the child had been nibbling at the window sills of the house in which she lived. The problem of differential diagnosis between Pb encephalopathy and tuberculous meningitis is discussed. On the basis of pathologic findings, it is concluded that the principal morphologic abnormality in Pb encephalopathy appears to be an alteration in the smaller blood vessels, which produces an increase in permeability and multiple zones of ischemic necrosis. These are widespread throughout the brain and the extensive damage explains why survival or normal mental function is so rare.

2874 Karpinski, F.E., Jr., Rieders, F., and Girsh, L.S. (Jefferson Med. Coll., Philadelphia, Pa.): CALCIUM DISODIUM VERSENATE IN THE THERAPY OF LEAD ENCEPHALOPATHY. Journal of Pediatrics 42:687-99 (June), 1953.

The authors' experience with the use of $CaNa_2EDTA$ is presented. Reported are the cases of 3 children ≤2 yr of age who had eaten paint for 6-12 mo. All 3 showed extreme irritability and severe tremors. In 2 cases papilledema was present and on admission 1 of these was blind. The Pb blood levels were 0.147, 0.185, and 0.22 mg%. Abnormal electroencephalographic tracings were obtained on all 3. EDTA was administered iv in a 5% glucose solution in daily doses of 1.0 g/30 lb. No more than 4.0 g/30 lb/wk were given. The highest dose given to any one patient was ≦14.5 g. There were no deaths and clinical improvement of variable degree was observed in all 3 patients.

The authors conclude by stating that CaNa_2EDTA is highly effective in mobilizing Pb in vivo and in rapid urinary Pb excretion. (42 references)

2875 Keefer, G.P., and Mokrohisky, J.F. (St. Christopher's Hosp.; Temple Univ., Philadelphia, Pa.): LEAD POISONING: ROENTGENOGRAMS OF THE CHEST AS AN AID IN DIAGNOSIS. Journal of Pediatrics 43:146-51 (Aug.), 1953.

Two fatal cases of Pb poisoning in children are presented in which more careful analysis of the X rays of the chest might have resulted in an earlier diagnosis. A review of 10 additional cases of Pb poisoning also revealed dense zones at the anterior ends of the ribs on chest X rays. These observations emphasize the importance of careful scrutiny of the anterior ends of ribs on all roentgenograms of the chests of infants and children. (From authors' summary; 14 references)

2876 Martin, R.V., and Shapiro, A.D. (Orange County Cerebral Palsy Diagnostic Treatment Center, Goshen, N.Y.): LEAD POISONING AS A CAUSE OF THE ATHETOID TYPE OF CEREBRAL PALSY. Archives of Pediatrics 70:20-2 (Jan.), 1953.

A case of cerebral palsy, although extremely rare, is presented in a 5-yr-old colored girl. After an initially normal development she developed pica, causing an unsteady gait, irritability and a regression in the toilet habits. Three weeks previous to the examination she suffered from projectile vomiting and became anorexic. Laboratory findings revealed the following: Hb, 8.5 g; 3.64 million red cells; evidence of achromia, anisocytosis, polychromia and a few stippled cells; urinalysis showed: 1.011 sg, acid, a trace of albumin and a few white blood and epithelial cells, Pb level 0.035 mg/700 ml (0.05 mg/l), sedimentation rate 8 mm/hr. Numerous X-ray studies revealed Pb lines in the knees and wrists, on the abdominal plate radiopaque material of metallic density was seen in the rectum with Pb lines in the iliac crest, essentially a negative abdomen, the chest plate showed generalized sclerosis of all the visible bones and deep bands of increased density in scapulae and the sternal ends of the ribs. Vitamin D and Ca lactate were administered to keep the Pb stored in the bones.

After 17 mo, at follow-up examination she was much improved and apart from some slow involuntary rotary motions in the feet and forearms and hands there were no positive findings. Diagnosis of rotary athetoid type of cerebral palsy was made. Because of success in the treatment of post-encephalitis athedoids, artane was advised, but its effectiveness could not be judged in this case, since it was not used until ~2 mo before the next follow-up, 1 yr after the preceeding one. The involuntary motions had become minimal, there was a slight limping, she appeared more alert and the toilet habits were much improved.

2877 Rubin, M., Gignac, S., Bessman, S.P., and Belknap, E.L. (Georgetown Univ.; Children's Hosp., Washington, D.C.; Columbia Hosp., Milwaukee, Wisc.): ENHANCEMENT OF LEAD EXCRETION IN HUMANS BY DISODIUM CALCIUM ETHYLENEDIAMINE TETRAACETATE. Science 117:659-60 (June 12), 1953.

The results of treatment of 4 cases of Pb poisoning with iv EDTA are shown in a table. Patients A, B, and C were children 3-5 yr old; D was a male adult. A and D were started on EDTA in an acute phase of the poisoning. A received 0.5 g daily for 3 days beginning on the 7th day, no treatment for 4 days and 1.0 g/day for 2 days; D received 0.5 g/day for 5 days, none for 2, 0.5 g for 4, none for 2, and 0.5 g the last 2 days. B who had survived an acute episode was treated 2 wk later, and C, suffering from chronic poisoning was treated 1 wk after exacerbation of the symptoms due to respiratory ailment. The authors conclude that the data reported indicate that administration of CaEDTA resulted in marked enhancement of Pb excretion in these patients.

2878 Van Wisselingh, C.J., and de Kruijff, C. (Children's Clinic, Mun. Univ. Amsterdam, Netherlands): Verhoogde loodabsorptie tengevolge van pica bij een jongen van 7 jaar, gecombineerd met achylia gastrica en hypochrome, microcytaire anaemie. (INCREASED LEAD ABSORPTION RESULTING FROM PICA IN A BOY AGED 7, COMBINED WITH GASTRIC ACHYLIA AND HYPOCHROMIC MICROCYTIC ANEMIA.) Maandschrift voor Kindergeneeskunde 21:128-38, 1953.

A case of severe hypochromic microcytic anemia with splenomegaly and achylia gastrica in a 7-yr-old boy is described. For 3 yr the patient had repeatedly eaten Pb-paint, and for a long time he had been suffering from malnutrition.

The difference between increased Pb-absorption and Pb poisoning is discussed. This patient showed no symptoms of Pb poisoning.

The authors stress the fact that such paint also contains other poisonous components which could have caused the symptoms. Finally the connection between achylia gastrica and hypochromic anaemia and the other causes of pica are discussed.

2879 Wilson, V.K., Thomson, M.L., and Dent, C.E. (Royal Manchester Children's Hosp; Univ. Coll. Hosp., London, England): AMINOACIDURIA IN LEAD POISONING. A CASE IN CHILDHOOD. Lancet 2:66-8 (July 11), 1953.

The patient was a boy, 4-1/2 yr old, who was admitted to the hospital in a mentally confused state. History reveals that for the past 3 yr he could not be restrained from eating wood and paint. In addition to the usual features of Pb poisoning in childhood, gross aminoaciduria was found, which varied in proportion with the glycosuria. As the level of the amino acids in the plasma was normal, this suggests that the Pb poisoning caused a defect in the renal tubules. Damage to the kidney tubules appears to be the immediate cause of the "acquired" renal glucosuria and aminoaciduria in these cases. (14 references)

1954

2880 Bain, K. (Children's Bureau, US Dept. HEW, Washington, D.C.): DEATH DUE TO ACCIDENTAL POISONING IN YOUNG CHILDREN. Journal of Pediatrics 44:616-23 (June), 1954.

Over 400 deaths of children under the age of 5 yr occur each year in the US from accidental poisoning. This rate is 4 times the British rate. Among materials for external use which account for 1/3 of the deaths, Pb ranks highest. In 1949-50 the rate/100,000 for accidental poisoning by Pb was 0.04 in 12 southern states, 0.27 in the remainder of the US or a total of 0.20.

2881 Bessman, S.P., Rubin, M., and Leikin, S. (Children's Hosp.; Georgetown Univ.; D.C. General Hosp., Washington, D.C.): THE TREATMENT OF LEAD ENCEPHALOPATHY - A METHOD FOR THE REMOVAL OF LEAD DURING THE ACUTE STAGE. Pediatrics 14:201-8 (Sept.), 1954.

A theoretical basis for the use of the Ca complex of EDTA for the deleading of patients with acute Pb poisoning is presented. Of 7 cases of Pb encephalopathy (4 boys and 3 girls 1-1/2-3 yr) treated with CaEDTA, 1 died soon after admission while the others showed prompt clinical improvement. Urinary excretion studies showed that ~1.8 mg Pb is excreted/500 mg CaEDTA administered for maximum efficiency of the therapy, ie, 0.5 g CaEDTA sc or iv every 8 hr for 5 days, then a 3-day rest period, followed by repetition of the course for 5 days. No signs of toxicity from CaEDTA were noted.

A general plan of therapy of Pb encephalopathy with CaEDTA is presented. The authors conclude in stating that the likelihood of causing harm with this therapy is minimal and the dangers that might result from delay justify the course. (16 references)

2882 Bradley, J.E., and Powell, A.M., Jr. (Univ. Maryland School Med., Baltimore): ORAL CALCIUM EDTA IN LEAD INTOXICATION OF CHILDREN. Journal of Pediatrics 45:297-301 (Sept.), 1954.

EDTA is an organic chelating agent valuable in treating Pb poisoning. It is most active when administered iv. In the cases here reported it was given to children orally. Five were selected with Pb poisoning contracted from eating paint or plaster containing Pb. In the hospital Pb excreted in their urine was determined by the dithizone method for several days before the EDTA was given at 75 mg/kg weight/day in divided doses at 6-hr intervals. A significant increase in urinary Pb promptly occurred in all the patients. The maximum excretion was reached between the 2nd and 4th days; then the amount excreted dropped, but it remained in excess of normal as long as EDTA was being given. EDTA was well tolerated and brought about disappearance of anorexia and irritability. A number of observations were made during the period on urinary coproporphyrin and on serum Ca and P. The conclusion is that EDTA should be useful in acute Pb intoxication and in Pb encephalopathy, when the rapid elimination of Pb is required. More research is wanted as to iv administration and as to dosage. The value of EDTA is undoubted.

2883 Byers, R.K., and Maloof, C., with assistance of De Simone, A., and Morrell (Mrs. M.E.) (Harvard Med. School; Children's Med. Center, Boston, Mass.): EDATHAMIL CALCIUM-DISODIUM (VERSENATE) IN TREATMENT OF LEAD POISONING IN CHILDREN. AMA Journal of Diseases of Children 87: 559-69, 1954.

Five children with Pb poisoning whose case histories are detailed were treated with EDTA. The diagnosis was based on identification of the source of poisoning, on clinical symptoms, and on abnormally high excretion of Pb in 24 hr. Three at least of 6 major signs had to be present to justify the diagnosis; secondary anemia with basophilic stippling; coproporphyrinuria; glycosuria in the presence of normal blood sugar; X-ray evidence at the metaphyses of the shafts of the long bones; signs of involvement of the nervous system; and vomiting, cramps and constipation. In 4 cases the Pb excretion was >80 μg/24 hr. When EDTA was given an increase in Pb output in the urine occurred, varying between 10-fold and 40-fold with rapid improvement in symptoms. One patient admitted in coma and convulsions was sitting up and feeding herself 36 hr later and began to talk in 48 hr. None of the others was so severely ill, but all were free of abdominal complaints promptly. Coproporphyrinuria disappeared in 7-10 days. The dosage of EDTA was 1 g/15 kg body weight/day, in 2 doses, administered iv in 250 ml of 5% dextrose solution. Not more than 5 g/15 kg body weight was given in any 1 wk. As the children tend to return to their habit of paint chewing, they must be removed from any possible temptation. Observations indicated that the occurrence of any infection will cause Pb to be transported from the bones to the soft tissues and so precipitate signs of Pb poisoning; in such a case EDTA is indicated immediately. EDTA appears to be a safe agent for removing Pb from the body.

2884 Byers, R.K., Maloof, C.A., and Cushman, M. (Harvard Med. School; Mass. Div. Occup. Hyg., boston): URINARY EXCRETION OF LEAD IN CHILDREN. DIAGNOSTIC APPLICATION. AMA Journal of Diseases of Children 87: 548-58 (May), 1954.

Various analytical methods based on the striking color produced by the reaction between Pb and diphenylthiocarbazone (dithizone) were explored by the authors. Methods based both on titration and direct colorimetry were studied, but though they gave quantitative data on aqueous solutions of mixture of salts, with urine the results were too uncertain for accurate work. After considerable investigation the authors found that by employing a modification of Fairhall's micromethod, which uses dithizone for the preliminary separation of Pb but that extracts the Pb from the dithizone and analyzes it as the dichromate, accurate estimation of the 24-hr urinary Pb was possible in properly collected samples.

Urinary excretion of Pb was studied in 68 children between the ages of 6 mo and 14 yr. Most of the children studied were controls, who had no history of exposure to Pb, but diagnoses of Pb poisoning were made in 23, and aside from any help obtained by measurement of urinary Pb excretion, the diagnoses were based on the presence of at least 3 of the major clinical signs of Pb poisoning in children; (1) secondary anemia with stippling, (2) evidence of involvement of the central or peripheral nervous system or both, as exemplified by clinical symptoms and signs and/or spinal fluid changes, (3) X-ray evidence of condensation of the lines of the provisional calcification of the shafts of the long bones, (4) glycosuria with normal blood sugar, (5) abdominal complaints, ie, vomiting, cramps, and constipation, and (6) chemical identification of the source of Pb. The excretion of >80 µg Pb/24 hr always indicated Pb poisoning in the age group examined. Values from 55-80 µg/24 hr always indicated more than the usual contact with Pb and the possibility of Pb poisoning. Values <55 µg/24 hr occurred in desperately ill patients with Pb poisoning, when renal blood flow was believed to be inadequate and for no apparent reason in 1 child with Pb poisoning. All control patients gave values <55 µg/24 hr. After a yr or more of protection from Pb ingestion, the urinary excretion of Pb in patients with known intoxication fell into the normal range.

The finding of a normal urinary 24-hr Pb excretion appeared to be fairly reliable in excluding recent Pb poisoning in persons with adequate renal blood flow. The authors illustrated on the basis of a case history the mistake of diagnosing Pb poisoning on the basis of a history of pica for paint and characteristic X-ray evidence in the bones. Urinary excretion of Pb was 21 and 14 µg/24 hr on 2 successive days, and samples of paint from the chewed window sills showed no Pb.

2885 Dahlström, A., and Odelstierna, E.: CASE OF LEAD INTOXICATION? Proceedings of the Section for Pediatrics and School Hygiene of the Swedish Medical Society. Acta Paediatrica 43:394, 1954.

Basophilic granulated blood corpuscles, coproporphyrinuria, X-ray density of the metaphyses and a pathological EEG suggested the possibility of Pb poisoning in a 10-mo-old child with convulsions. However, absence of exposure during the previous 40 days before the appearance of symptoms as well as the absence of Pb in the urine render the diagnosis of Pb poisoning questionable. The pathological findings rapidly became normal.

2886 Henderson, D.A. (Queensland Inst. Med. Res., Brisbane, Australia): A FOLLOW-UP OF CASES OF PLUMBISM IN CHILDREN. Australasian Annals of Medicine 3:219-24 (Aug.), 1954.

A follow-up was made of 401 children, who were in the Hospital for Sick Children, Brisbane, between the years 1915 and 1935 with a diagnosis of Pb poisoning. Of these, 165 are known to be dead and 187 to be alive, and nothing is known of the fate of the remaining 49. One hundred eight of the causes given on the death certificates were classified as being renal or vascular disease. Seventeen of the living members have hypertension and albuminuria and 3 have hypertension alone. The evidence available indicates that the original diagnosis of Pb poisoning was probably correct in the majority of the cases. (14 references)

2887 Henderson, D.A.: CHRONIC NEPHRITIS IN QUEENSLAND. Queensland Institute of Medical Research, Ninth Annual Report, 1954, pp. 11-2.

The author describes briefly the results of research on Queensland chronic nephritis, stating that evidence shows the high incidence of the disease to be due to Pb absorption in childhood. In comparison with the remainder of Australia, mortality from chronic nephritis in Queensland began to rise about 1890 with the rise affecting the 10-20 age group first, then the older ones in succession, reaching the 50-60 age group about 1930 but not extending to the groups >60 yr of age. The incidence in the younger age groups began to diminish about 1925 when the causative agent, appearing in 1890, began to disappear about 1920-30. Follow-up of persons who as children had had Pb poisoning between 1915 and 1935 showed that at least 128 of the 400, and probably more, have died of it or are still living with "chronic nephritis." However, only a relatively small percentage (10-20) of such cases state a history of Pb poisoning in childhood. This may mean that either Pb poisoning is only partially responsible or Pb absorption in childhood occurred without any clinical manifestations at the time. In order to maintain the thesis that excessive Pb absorption in childhood is the major cause of the high mortality from chronic nephritis, some evidence must exist that excessive Pb was absorbed in the majority of cases, done by estimations of bone-Pb content at autopsy. Although studies at this time were as yet incomplete, they showed a bone Pb content significantly higher in the majority of cases of "chronic nephritis" including those with no known past history of Pb absorption than in controls. The mechanism by which Pb produces the renal lesion remains unknown and work on experimental animals has until then proved fruitless. The author closes his report by a statement of studies as yet to be done and the announcement of a forthcoming paper on the statistical and clinical aspects of Queensland nephritis, pending bone-Pb estimations in an adequate number of autopsies. (20 references)

2888 Marti, A., Costales, F., and Borbolla, L. (Pediatric Serv. Univ. Hosp., Havana, Cuba): Intoxicación por el plomo; reporte de un caso de encefalitis plúmbica en un nino. (LEAD POISONING: REPORT OF A CASE OF LEAD-INDUCED ENCEPHALITIS IN A CHILD.) Archivos del Hospital Universitario 6:97-

108 (Jan.-Feb.), 1954.

The symptoms, diagnosis, prognosis and treatment of Pb poisoning with encephalopathy in children is first reviewed. The case reported was that of a 4-1/2-yr-old white boy who was admitted to the hospital with convulsions. As summarized by the authors, this was a typical case of Pb encephalitis, presenting gingival line, anemia, reticulocytosis, stippled cells, radiologic changes and Pb content of blood 72 μg/100 ml. In addition to classical treatment with Ca citrate, oral and injected Ca, vitamin D, and phenobarbital, BAL was administered. At discharge, psychiatric examination showed mental retardation. The source of Pb exposure was the father's home shop of repairing and constructing storage batteries, where the child played and chewed Pb scraps.

2889 Smith, H.D.; Houston, S. (Children's Hosp., Cincinnati, O.): LEAD POISONING IN CHILDREN. 1. MEDICAL CARE. 2. NURSING CARE. American Journal of Nursing 54:736-8; 738-9, 1954.

In Part 1, Smith emphasizes that because Pb poisoning in children is frequently not suspected until brain damage has resulted, general awareness and an informed population along with doctors who are alert to the early manifestations is called for. Based on his experience in Cincinnati the incidence is increasing rather than decreasing. Over the period 1944-1954 out of 40 reported cases in Cincinnati 15 were fatal and the surviving 25 children exhibited some degree of encephalopathy; of the latter, there are probably 3 idiots. A study by Byers and Lord (1943) suggests that even in milder cases an unhappy outcome may result. They reported their observations on 20 cases of Pb poisoning without gross brain damage at discharge from hospital; 8 children had exhibited mild encephalitic symptoms but 12 showed no such involvement. Only 1 of the 20 had consequently been able to make a normal school adjustment.

As the early manifestations are given: abdominal pain, frequent anorexia, vomiting, persistent constipation, irritability, frequent headache, pallor, anemia and pica. More serious symptoms show as the intoxication advances. The Pb-gumline is not common with children. Blood smears to determine the stippled erythrocytes, lumbar puncture, examination of the long bones, urinary coproporphyrin tests and analysis of the whole blood are the recommended diagnostic aids. Since no specific drug can be recommended by the author, he feels that skillful nursing aid has to be relied on to bring some comfort and relief for the sick children.

Houston outlines the nursing care during intravenous therapy and presents instructions for nurses in presurgical therapy and postoperative care. Attention is drawn to the role of parents as part of the team that takes care of the child that is hospitalized for Pb intoxication.

2890 Williams, H.W., Caraway, W.T., and De Young, W.A. (Rhode Island Hosp., Providence): INACTIVATION OF ANTIBODIES, A CAUSATIVE FACTOR OF BRAIN PATHOLOGY IN ACUTE LEAD INTOXICATION. AMA Archives of Neurology and Psychiatry 72:579-82 (Nov.), 1954.

A fatal case of Pb poisoning in a 23-mo-old child with a history of eating paint is reported. Since the neuropathologic findings observed in this case seemed more consistent with a pathogenesis of bacterial toxins derived from a septicemia than with an exogenous toxin, Pb, the theory was advanced that abnormal concentrations of Pb in the blood inactivate antibodies diminishing resistance to bacterial invasion and growth. Pb at a concentration of 0.12 mg/100 ml precipitated γ-globulins. Therefore, it is postulated that this action can also affect the antibody systems since these are γ-globulins. Through this inactivation of the antibodies, the pathological changes in the central nervous system may be the result of the toxic products of the less inhibited growth of infectious agents. In those instances where the blood Pb level exceeds the critical range, the elapsed time may not have been sufficient for the manifestation of the direct toxic effects of the Pb.

1955

2891 Anonymous: POISONING IN CHILDREN. Editorials and Comments. Journal of the American Medical Association 157:347-8, 1955.

In the United States in 1949-1950 the annual number of deaths due to accidental poisoning in children <5 yr of age was 2.6/100,000 population, or 4 times that of Great Britain. This fact indicates a carelessness or complacency that cannot be condoned. Add to this the fact that for each child who dies from this cause many recover and that many of these are left crippled by Pb encephalitis, liver or kidney damage, and cicatricial closure of the esophagus, and the magnitude of the problem, far exceeding that of poliomyelitis, becomes apparent. Poisonings by chewing Pb paint or by Pb fumes resulting from the burning of old battery casings are among those mentioned. Steps taken to prevent these accidents are discussed.

2892 Anonymous: UNUSUAL CAUSE OF LEAD POISONING. Foreign Letters. Journal of the American Medical Association 157:609 (Feb. 12), 1955.

See Abstract No. 2897.

2893 Chisolm, J.J., Jr., Harrison, H.C., Eberlein, W.R., Harrison, H.E., with assistance of Mohr, F.C. (Harriet Lane Home for Invalid Children; Johns Hopkins Univ. Med. School, Baltimore, Md.): AMINO-ACIDURIA, HYPOPHOSPHATEMIA, AND RICKETS IN LEAD POISONING. A.M.A. American Journal of Diseases of Children 89:159-68 (Feb.), 1955.

A case of Pb poisoning in a 33-mo-old child is described. In addition to the usual well known clinical findings of acute encephalopathy and anemia, this patient presented hypophosphatemia, glycosuria, aminoaciduria, and the skeletal changes of acute rickets. It is postulated that these findings were related and were primarily the result of a disturbance of renal tubular function due to Pb. This disturbance was reversible and disappeared under treatment. The similarity of this biochemical disturbance to that observed in the Toni-Fanconi syndrome is pointed out. The authors suggest that the same or related renal tubular enzyme systems are involved in Pb poisoning. Citrate accelerated the healing of rickets in the presence of a toxic concentration of Pb which had produced the defect of calcification initially. As calcification of new bone occurred, Pb was deposited with the new bone salts. With the removal of Pb to a tissue where it was deposited in a physiologically inert form, the internal balance of Pb metabolism was shifted and soft-tissue concentrations of Pb were reduced; coincidentally biochemical renal tubular dysfunction disappeared. (24 references)

2894 Editorial: LEAD POISONING. Journal of the American Medical Association 158:47-8, 1955.

In an editorial on the incidence of Pb poisoning in childhood, its diagnosis and treatment, attention is drawn to the fact that correct diagnosis depends largely on considering Pb poisoning a possibility when several cases occur within a short time among children. Confirmation or exclusion of the occurrence of a dangerous degree of Pb absorption may be accomplished by the determination of the Pb concentration in whole blood. Sometimes the confirmation, not the exclusion, can be achieved by the analysis of urine, but in children the analysis of whole blood is to be preferred. $CaNa_2EDTA$ is recommended to remove Pb from the system and preferred over BAL or cortisone or corticotropin.

2895 Gibb, J.W.G., and MacMahon, J.F. (Manor Hosp., Epsom, Surrey, England): ARRESTED MENTAL DEVELOPMENT INDUCED BY LEAD-POISONING. British Medical Journal 1:320-3 (Feb. 5), 1955.

A case of arrested mental development in a 7-1/2-yr-old boy caused by Pb poisoning (probably at age 3) was described and its implications and those of others in the literature discussed with particular reference to the following: (1) The diagnosis of Pb intoxication may be delayed over long periods during which serious and possibly irreversible brain damage may be done, with resultant arrest of mental growth, the appearance of "sensorimotor" defects, and both social and educational disabilities. (2) Pica, more often than not, precedes Pb poisoning in children, and, as its implications are not always recognized, its occurrence may not be reported with appropriate emphasis. Hence there is the possibility that Pb ingestion is not considered when the presenting symptomatology suggests such conditions as food poisoning, pertussis, infantile autism, amentia, sensorimotor defects, educational subnormality, hyperkinetic disease, and behavior disorders. (3) The need for appropriate screening and follow-up procedures has been indicated in the light of probability that the real incidence of Pb intoxication is much greater than hitherto envisaged.

The authors hope that the Ministry of Health, local authorities, medical practitioners, parents, and all concerned with child welfare will take appropriate action to safeguard children from exposure to the risks of Pb poisoning.

2896 Giles, H.McC., Moore, C.J., and Still, B. M. (St. Mary's Hosp., London, England): TREATMENT OF LEAD POISONING WITH CALCIUM DISODIUM VERSENATE. Lancet 1:183-5 (Jan. 22), 1955.

Previous reports on the use of EDTA in the treatment of Pb poisoning have all come from US. EDTA, or $CaNa_2$ versenate, is the Ca complex of ethylenediamine tetraacetic acid, which is a chelating agent, ie, a substance capable of binding multivalent metallic ions so as to cause their functional removal from a solution. A metal forming a stronger complex can replace one forming a weaker complex. Thus, Pb replaces Ca from the $CaNa_2$ complex, which, for this reason, is used in the treatment of Pb poisoning.

The patient treated was a child, 2-1/2 yr old, who became ill after chewing Pb-coated telephone wires. In addition to ordinary signs of Pb poisoning, X rays of the long bones showed dense bands at the metaphyses. Symptoms of encephalopathy were developing when treatment was started. EDTA was given iv at intervals of 12 hr at 0.5 g in 200 ml of 0.18% NaCl in 4.3% dextrose. Each infusion lasted ∼2 hr. Three 5-day courses were given, with intervening rest periods of 6 and 9 days. The mental condition improved steadily and the child was bright and alert in 3 days. Vomiting and convulsions ceased. Corpproporphyrin gradually disappeared from the urine, as well as stippled cells from the blood. The blood Pb level steadily fell, and there was an increase of excretion of Pb in the urine, but this was not increased further by ammonium chloride. No toxic effects from EDTA were noted. (15 references)

2897 Gillet, J.A. (Med. Officer Health, Rotherham, England): AN OUTBREAK OF LEAD POISONING IN THE CANKLOW DISTRICT OF ROTHERHAM. Lancet 1:1118-21 (May 28), 1955.

The author was informed that twin boys aged 3-1/2 yr had been admitted to the hospital with the diagnosis of Pb encephalopathy which the general practitioner had made. Immediate action was taken: the house of the children was visited, but it was the area Health Visitor who provided the information that it was a fairly common practice to burn old battery casings as fuel. A detailed account is given of the well-planned and extensive investigations which were then made to discover the homes where battery casings had been burned, to have these homes visited to secure information and to examine clinically and pathologically as many of the children and adults as possible who had been at risk. Details of the analysis of the casings and of their burnt ash are also given. It was not possible to obtain blood specimens from and to examine all persons at risk, because many were not responsive. The main results, however, were that no case of Pb poisoning in adults was discovered, but up to the time 5 cases of Pb poisoning and 49 cases of Pb absorption in children were observed. In addition, the bodies of 2 dead children were exhumed and analysis of the organs indicated that death had been due to the inhalation of Pb. The causes of death in these had been said to be epilepsy in one and cholemia and infectious hepatitis in the other. There appeared to be little doubt that the source of the Pb was either the unburnt Pb casings or the ash after combustion, but the route of the Pb into the system must remain uncertain. The protection of the public from the danger of Pb poisoning through battery casings is discussed.

2898 Kneller, L.A., Uhl, H.S.M., and Brem, J. (Worcester City Hosp., Mass.): SUCCESSFUL CALCIUM DISODIUM ETHYLENE DIAMINE TETRA-ACETATE TREATMENT OF LEAD POISONING IN AN INFANT. New England Journal of Medicine 252:338-40 (Mar. 3), 1955.

The case is reported of a 20-mo-old male infant hospitalized with signs of Pb intoxication probably due to chewing dry paint from window sills. Symptoms also indicated encephalopathy, although an EEG taken during sleep was normal. After unsuccessful symptomatic treatment, the patient was treated with EDTA administered in a dose of 0.5 g of EDTA/100 ml physiologic saline by subcutaneous clysis. The clyses, administered 3 times/day for 5 days, were given over a 1-hr period; absorption occurred between 1-1/2-2 hr. The procedure was well tolerated. The course of the case is described; on the 5th day of therapy considerable improvement was obvious; and the patient was finally discharged, cured. A year later he was seen in excellent health. The theoretical value of EDTA is discussed. The claim is made that EDTA is the drug of choice in Pb poisoning; it is effective and can be easily administered by the method described. (16 references)

2899 Lewis, B.W., Collins, R.J., and Wilson, H.S. (St. Louis, Mo.): SEASONAL INCIDENCE OF LEAD POISONING IN CHILDREN IN ST. LOUIS. Southern Medical Journal 48: 298-301, 1955.

Cases of Pb poisoning in children, with fatalities, have occurred in St. Louis. The ingestion of material containing Pb compounds is the cause. The incidence of Pb poisoning in children in St. Louis is highest in the summer season, when the total actual sunshine hours are the greatest. The problem of pica is inextricably mixed with the cases of childhood plumbism. A discussion on the legal steps to be taken and stress, placed upon early diagnosis and adequate treatment, conclude the paper. (From authors' summary)

2900 Marsden, H.B., and Wilson, V.K. (Royal Manchester Children's Hosp., England): LEAD-POISONING IN CHILDREN; CORRELATION OF CLINICAL AND PATHOLOGICAL FINDINGS. British Medical Journal 1:324-6 (Feb. 5), 1955.

A description of the clinical and pathologic findings of 2 fatal cases of Pb poisoning in children is presented. Particular attention is given to the changes in the kidneys, since these changes have very often been underestimated in previous literature. The difficulty in making a diagnosis of Pb poisoning is emphasized. The author cites Anderson (1948) who pointed out that the central nervous system is particularly susceptible at early age, and that encephalopathy may develop even in the absence of anemia and colic, which points to the need of considering Pb poisoning in the presence of vague cerebral symptoms or evidence of increased intracranial tension.

In both cases described, vague symptoms were present toward the end of the 2nd yr, but no diagnosis was made at that time. Case 1 lived to the age of 4 yr when the anemia, constipation, abdominal colic and basophilic stippling suggested Pb poisoning; in the 2nd case the diagnosis was made at necropsy. In discussing the gross and microscopic findings, the authors state that these were not striking. There was some increase in weight of liver and kidneys, and giant nuclei in the renal tubules. Damage to the cortex and outer portion of the medulla involving convoluted and looped tubules was seen, but no evidence of cellular infiltration. The pattern of the urine chromatogram confirmed Fanconi's theory on the absorption of dextrose and amino acids in the proximal tubules.

The author notes that postmortem diagnosis is facilitated by examining the cut end of a rib for the white band close to the cartilage, and by examining frozen sections of liver and kidney for intranuclear inclusions. (17 references)

2901 Mellins, R.B., and Jenkins, C.D. (US Pub. Health Serv.; Chicago Board Health, Ill.): EPIDEMIOLOGICAL AND PSYCHOLOGICAL STUDY OF LEAD POISONING IN CHILDREN. Journal of the American Medical Association 158:15-20 (May 7), 1955.

During 1953, 21 cases of Pb poisoning in children were detected, 5 of which were fatal. The children ranged in age from 10-44 mo and pica was the outstanding precursor. Vomiting, constipation, abdominal pain, weight loss, lethargy, irritability and convulsions were the principal signs and symptoms and appeared mostly during the summer months. A behavioral syndrome characterized by irritability, fearfulness, weakness, withdrawal and unexplained crying commonly occurred 1-2 wk prior to hospitalization. The diagnosis was confirmed by the detection of anemia, basophilic stippling of the erythrocytes, increased coproporphyrinuria, elevated urinary and blood Pb levels and traverse bands of increased density at terminal segments of the growing bones on X ray. There was no pattern in the geography of the incidence although the cases were largely confined to the slum areas.

The 5 fatal cases died of encephalopathy. Of the surviving 16 children, 15 were studied 4-6 mo after discharge from hospital by using detailed developmental histories and tests, observing spontaneous and elicited behavior and interviewing the parents. Prior to the onset of Pb poisoning, only 1 of the patients was retarded in motor development, 3 were slow in speech development and 6 were emotionally immature. Approximately 6 mo subsequent to the poisoning 14 of the 15 patients were found to be markedly retarded in some way: language ability (12), finer muscle coordination (11); 10 children became emotionally unstable and extreme distractibility, short attention span and high variability on the psychological tests were characteristic. (From authors' summary)

2902 Sanford, H.N. (Univ. Illinois Coll. Med., Chicago): LEAD POISONING IN YOUNG CHILDREN. Postgraduate Medicine 17:162-9 (Feb.), 1955.

Two cases are reported, stated by the author to be typical of Pb poisoning in children <3 yr old: Case 1 was a 30-mo-old girl who had eaten paint from window sills for 4 mo; Case 2, 22-mo old, had done so for 5 mo. In the 1st, screaming had developed suddenly, then vomiting; at admission, hemoglobin was 7 g/100 ml, X rays showed increased density at ends of the radius and ulna, increased excretion of coproporphyrin (CP), 0.1 mg Pb/l urine, and 132 μg Pb/100 ml blood were found; EEG revealed some slowing of the waves. In the 2nd, vomiting and clonic convulsions had occurred; she showed signs of palsy of the 6th cranial nerve, EEG indicated extensive slowing of waves; other findings were similar to Case 1 (urinary Pb was 0.09 mg/l, blood contained 83 μg/100 ml). The 1st child was treated with Na citrate, high Ca and vitamin D diet, and Case 2, with BAL. The author discusses the diagnosis, stressing the importance of CP determination, and treatment with chelating agents.

2903 Tanis, A.L. (US Naval Hosp, Key West, Fla.): LEAD POISONING IN CHILDREN. INCLUDING NINE CASES TREATED WITH EDATHAMIL CALCIUM-DISODIUM. A.M.A. American Journal of Diseases of Children 89:325-31, 1955.

A report is presented on 33 cases of Pb poisoning in children 10 mo-4-1/2 yr old. Of the cases 43% was in the age range 1-2 yr, and 27% from 2-3 yr, 20 of which were diagnosed from 1939-52 and 13 in 1953. In the latter group, diagnosis was substantiated by history and laboratory examination. The 20 boys and 13 girls were from the lower socioeconomic classes from all over Chicago. Most cases occurred in June-August (79%). Six cases were fatal (18%). The frequency of symptomatic complaints is tabulated. Among the findings hypochromic anemia was found in 14 children; basophilic stippling in 94%; abnormally high reticulocyte count in almost all; in ~50%, albumin was found in the urine, and in 21%, glucose. The urinary Pb excretion was significantly elevated in 20 although there was no correlation between the degree of severity of the symptoms and the quantity of Pb excreted/24 hr.

Of 8 children whose urine was analyzed for porphyrin 6 exhibited increases; however, porphyrins were not present consistently in the urine. Blood Pb levels were analyzed in only 2 patients before 1953 (results, 0.067 and 0.167 mg/100 ml vs normal of 0.03-0.06 mg/100 ml). The author noted that because of the apparent increase in Pb poisoning in 1953, this disease will probably become reportable in Chicago. Facilities were made available for blood Pb determinations. Four samples so analyzed showed 0.047-0.109 mg/100 g. It was thus seen that the value of blood determination (under consideration of variables such as time of day of sampling, ingestion of food and pH of the blood) lies in its use in screening patients with possible Pb intoxication. Aside from the above findings, signs of increased intracranial pressure (papilledema, Macewen's cracked-pot resonance) were present in the children who died. Tremor, ataxia, and motor weakness were seen in several others. Bone X-ray changes were significant in 85% of the patients, and 3 children showed in addition increased density throughout the large intestine, indicating recent ingestion of Pb paint chips. Abnormal constituents in the cerebrospinal fluid, in the absence of papilledema, were found in 20 of the 33 cases. Electroencephalograms were taken during the course of acute illness in 8 patients, and in 4, after discharge. In 6 of the 9 cases treated with $CaNa_2$-EDTA iv, excellent results were obtained, with no adverse effects; in only 1 case was a direct sensitivity to the drug suspected. The blood and spinal fluid chemistries and urinary Pb findings before and after treatment are tabulated.

2904 Thurston, D.L., Middelkamp, J.N., and Mason, E. (Washington Univ., St. Louis, Mo.): THE LATE EFFECTS OF LEAD POISONING. Journal of Pediatrics 47:413-23 (Oct.), 1955.

During the period 1940-1950, 26 children were treated for Pb intoxication. The source of Pb was ingestion (paint, plaster, toys). Of them 7 (27%) died: 6 on initial hospitalization and one 2 yr later with Pb encephalitis. Of the remaining 19 patients 11 were followed for a 5-10 yr-period with repeat physical, psychologic and laboratory examinations. Five of them had been diagnosed and treated on an outpatient basis and the other 6 were hospitalized. Of the latter, 2 were subsequently hospitalized with intercurrent infections which precipitated a return of the symptoms of Pb intoxication. The patients were empirically classified as mild, moderate, moderately severe, and severe.

As summarized, the physical sequelae consisted of blindness and cerebral dysrhythmia. Na citrate was the specific therapy in all cases and was given over a variable period of time or until there was no laboratory evidence of Pb intoxication. There was no evidence in this series of continuing mental deterioration. Considering the major mode of instruction in the primary grades, the authors feel that these children are at a serious disadvantage and should receive special attention to offset their visual-motor deficit. As the child matures there is a gradual loss of the inward driven hyperactive behavior frequently seen in brain-damaged children. There is no direct correlation between the severity of the illness and the amount of residual effect. Pediatric counseling might be influential in reducing a parental overprotective attitude which adds to the child's problem. (20 references)

1956

2905 Biehusen, F.C., and Pulaski, E.J. (Tripler Army Hosp., Honolulu, Hawaii): LEAD POISONING AFTER INGESTION OF A FOREIGN BODY RETAINED IN THE STOMACH. New England Journal of Medicine 254:1179-81, 1956.

A 23-mo-old child who had ingested a key-chain emblem made of a Pb containing solder alloy and retained it in the stomach developed anorexia, vomiting, weight loss, and irritability after ~45 days. After surgical removal of the emblem on the 68th day, Pb intoxication was proved by Pb lines in X-ray pictures of the long bones and by profuse basophilic stippling of red blood cells. It was successfully treated by $CaNa_2EDTA$. After the 1st course of treatment, the 24-hr urine contained 0.056 mg Pb and the serum contained 0.01 mg Pb/100 ml, and after the 2nd, <0.01 mg/100 ml.

2906 Bradley, J.E., Powell, A.K., Niermann, W., McGrady, K.R., and Kaplan, E. (Univ. Maryland, School Med.; Baltimore City Health Dept.): THE INCIDENCE OF ABNORMAL BLOOD LEVELS OF LEAD IN A METROPOLITAN PEDIATRIC CLINIC, WITH OBSERVATION ON THE VALUE OF COPROPORPHYRINURIA AS A SCREENING TEST. Journal of Pediatrics 49:1-6, 1956.

Attention is being focused on the relatively high incidence of Pb intoxication in children due frequently to the pica habit. In the period 1931-55, 462 children, most of whom came from low-income areas of Baltimore, were admitted to hospitals with Pb encephalopathy or other manifestations of Pb intoxication. In many cases the children had opportunity to eat or chew flakes of paint from the ill-kept houses. This large number of cases suggested that there might be a high incidence of Pb intoxication in the same areas in children who did not show significant or recognized symptoms of Pb poisoning. An investigation was undertaken of 604 children of ages 7-60 mo, all of whom came from a low-income area and attended a Well-Baby Clinic at the University of Maryland Hospital. Urine was examined for coproporphyrin (CP) III (de Langen and ten Berg modified by McCord). This gave opportunity to assess the value of the test since it is used by many industrial firms as a method of screening their workers for exposure to dangerous amounts of Pb. All children with a positive CP test of 2+ (197 children) and alternate children with a negative CP test had the following additional studies: blood Pb determination (dithizone method), Hb, erythrocyte count, stipple count, X ray of long bones, a complete history and a careful physical examination. The results are described, shown in tables and discussed. As summarized, the findings were: (1) The mean blood Pb for the 2 groups was 0.043 mg%; the upper limit of normal blood Pb seems to be 0.05 mg%, as at and above this value there was an increase in symptons and findings ascribed to Pb intoxication; (2) there was no significant difference of blood Pb or other findings of Pb intoxications in the patients with or without CP; (3) abnormal blood Pb values were found in 44.4% of the 333 children studied; and (4) a history of pica was noted in 69.6% of the children with a blood Pb of ≥0.05 mg%. This finding gave higher correlation with blood Pb than any other test or symptom. (17 references)

2907 Chisolm, J.J., Jr., and Harrison, H.E. (Johns Hopkins Hosp.; Pediatric Div. Baltimore City Hosp., Md.): QUANTITATIVE URINARY COPROPORPHYRIN EXCRETION AND ITS RELATION TO EDATHAMIL CALCIUM DISODIUM ADMINISTRATION IN CHILDREN WITH ACUTE LEAD INTOXICATION. Journal of Clinical Investigation 35:1131-8, 1956.

In children with Pb poisoning a positive correlation was demonstrated between the urine Pb output during the 1st day following the parenteral administration of EDTA and the total daily urinary coproporphyrin (CP) output just prior to the administration. This relationship is an exponential one and was demonstrated in both the early recovery phase and the chronic phase of Pb poisoning. A similar correlation was found between the simultaneous daily urinary excretion of CP and Pb during EDTA administration. During the convalescent phase in children who had recovered from acute Pb encephalopathy an exponential relation was also found between the whole blood Pb concentration and total daily urinary CP excretion. This relationship could not be shown during the initial acute phase of encephalopathy when whole blood Pb concentration was frequently quite high and decreasing rapidly. These data indicate that the urinary CP output is related to that fraction of Pb in the tissues which is available for chelation and urinary excretion under the influence of EDTA. From the urinary CP output one can predict the magnitude of Pb output in the urine which will follow the parenteral administration of EDTA. Since it is believed that this chelating agent initially removes Pb primarily from nonskeletal tissues, it appears reasonable to propose that the urinary CP output is correlated with the concentration of Pb in soft tissues. Hence, the urinary CP excretion provides a sensitive biochemical index of "metabolically active" and presumably toxic Pb in tissues. (From authors' summary; 24 references)

2908 Chisolm, J.J., Jr., and Harrison, H.E. (Johns Hopkins Univ. School Med.; Baltimore City Hosp., Md.): THE EXPOSURE OF CHILDREN TO LEAD. Pediatrics 18:943-58, 1956.

Ingestion of paint chips and plaster containing Pb is an important cause of plumbism in children. Indentification and removal of environmental sources of Pb is essential, since constant supervision of children to prevent eating of Pb-containing materials is impractical when these materials are within the child's reach. The old Pb-containing paint should be burned away completely or the child should be transferred to a dwelling in good repair. Among children who survive acute Pb encephalopathy, frequency of permanent central nervous system damage is increased by reexposure to Pb.

In old, poorly maintained dwellings, layers of flaking paint often contain excessive quantities of Pb. Even if Pb composes only 1% or less of total solids in each layer of paint, application of several layers to one surface increases the quantity of Pb per unit area to the extent that even a small flake may contain toxic concentrations. In 1 home, paint flakes weighing 2.68 g which were removed from a door frame contained 254 mg of Pb. Because intake of more than 1.5 mg of Pb daily may cause toxic symptoms, ingestion of even a small quantity of such paint is dangerous.

Symptomatic Pb intoxication is most frequently observed in the summer. Possibly, vitamin D and the actinic rays of the summer sun increase the absorption of Pb from the intestine. Heat may lead to dehydration and acidosis in small children and thereby promote encephalopathy.

The mean daily fecal output of Pb among 6 children with Pb poisoning was ~6 times fecal Pb output in a group of severely exposed industrial workers. The more frequent occurrence of encephalopathy in children than in adults probably depends, therefore, upon more intense exposure to Pb in young persons. (21 references)

2909 Harrison, H.E. (Baltimore City Hosp., Md.): CHILDHOOD LEAD POISONING. New York State Journal of Medicine 56:3938-43, 1956.

Between 1935 and 1947 the average yearly reported incidence of childhood Pb poisoning was 15 cases with an average of 5 fatalities per year. In 1948 due to increased interest there was a sharp increase in morbidity. Since 1948 ~40 cases/yr are reported, with the fatalities remaining fairly stable. The authors discuss incidence, source of intoxication, seasonal variation, signs and symptoms and diagnosis of Pb poisoning. The treatment with $CaNa_2EDTA$ is discussed in detail.

2910 Jean, R. (Pediatric Clinic, Montpellier, France): Sindrome biologica che ricorda quella della sindrome di De Toni-Debré-Fanconi nel corso di una intossicazione da piombo. (BIOLOGICAL SYNDROME SIMULATING DE TONI-DEBRE-FANCONI SYNDROME DURING LEAD POISONING.) Minerva Pediatrica 8:571-2, 1956.

A 3-yr-old child exhibited headache, vomiting and asthenia. Urinalysis showed the presence of glycosuria (1-5 g/1000), phosphaturia and hyperaminoaciduria. The blood findings were 0.30 g/l azotemia, 0.71 g glycemia (fasting), calcemia 100 mg, phosphatemia 15 mg/l phosphatase 11.7 Bodanski units. The findings which were diagnosed as Toni-Debré-Fanconi syndrome, and signs which indicated intracranial hypertension, led the author to seek a toxic origin. Chemical analysis revealed in blood 2.5 mg Pb/l. After BAL treatment all functions returned to normal. The hypothesis was advanced that Pb poisoning may produce enzymatic disturbances comparable to the syndrome of De Toni-Debré-Fanconi.

2911 Jean, R. (Montpellier, France): Syndrome biologique évoquant celui du syndrome de de Toni-Debré-Fanconi au cours d'une intoxication par le plomb. (BIOLOGICAL SYNDROME SIMULATING DE TONI-DEBRE-FANCONI DURING LEAD POISONING.) Pédiatrie 11, No. 2:263-5, 1956.

See preceding abstract.

2912 Kuvin, S.F. (Newark, N.J.): LEAD POISONING IN CHILDREN. A RAPID SCREENING TEST AS AN AID IN DIAGNOSIS. Medical Times 84:471-4, 1956.

Pica and elevated excretion of urinary CP are indicative of Pb poisoning. A qualitative screening test for CP was described. Case reports of 2 male children, 2- and 3-yr-old, are given. Both children exhibited increased CP and hypochromic anemia. Upon treatment in case 1 with 2 iv doses of 0.5 g each of $CaNa_2EDTA$ every 12 hr, and sc doses of 0.5 g 3 times/day for 4 days, the urinary Pb excretion on the 2nd day of therapy was 3.7 mg/24 hr. The Pb level in the blood after completion of the initial course of therapy was 1.15 mg/100 ml. The 2nd patient showed 0.059 mg Pb/100 ml blood and 0.13 mg Pb/24 hr in the urine before therapy. During sc administration of 4 g $CaNa_2EDTA$ divided over 3 days, the urinary Pb level was 0.35 mg/24 hr. Both children recovered without evidence of residual damage.

2913 McLaughlin, M.C. (Jamaica Health Center, New York City Dept. Health, N.Y.): LEAD POISONING IN CHILDREN IN NEW YORK CITY, 1950-1954; AN EPIDEMIOLOGIC STUDY. New York State Journal of Medicine 56, No 23:3711-4, 1956.

Pb poisoning has been reported in 143 children (151 hospital admissions) from 1950-1954 with 39 fatal cases. With better reporting and diagnosis the case fatality fell from 48% in 1953 to 15.2% in 1954, the 5-yr case fatality was 27.3%. All cases were in children ≤6 yr of age with 67% of them in the 1st and 2nd yr. There were 73 white children and 61 Negro children and 28 of Puerto Rican extraction. The more likely number is 64. Eighty cases (56%) were female and, 63% were male. Of all the hospital admissions 60% were in the summer months of the year. Pica occurred in 82% of the patients and in 9 families there were multiple cases. Most were reported from areas where the housing was substandard and where the hospitals were interested in the problem.

2914 Millican, F.K., Lourie, R.S., and Layman, E.M. (Children's Hosp. George Washington Univ. School Med., Washington D.C.): EMOTIONAL FACTORS IN THE ETIOLOGY AND TREATMENT OF LEAD POISONING. A STUDY OF PICA IN CHILDREN. AMA American Journal of Diseases of Children 91:144-9, 1956.

It is stated that "In order to treat Pb poisoning in children adequately, it is necessary to consider the factors which cause children to ingest Pb-containing substances" since the eradication of these factors is essential to cure the child of the pica habit. A basic study was made of 6 children with this habit, of age ranging from 18-38 mo who had been treated for Pb poisoning. The study was made by means of 1 or 2 interviews with the mother, psychological studies of mother and child and a psychiatric playroom interview with the child. The tests, one or more of which was administered to each child, were the Minnesota Pre-School Scale, Gesell Developmental Schedules, Cattell Infant Intelligence Scale, Vineland Social Maturity Scale, Merrill-Palmer Scale of Mental Tests and Stanford-Binet, Form L. From the results which are fully described it is concluded that factors which had contributed to the pica were the encouragement by the mother of the child's excessive oral activities, significant separations of the child from its mother and emotional problems of the mother which interfered with a good mother-child relationship. Economic and cultural factors, as well as factors of organic brain damage also contributed. Although the number of cases studied is small, the findings indicate the need for more intensive study to further our understanding of pica.

2915 O'Donohoe, N.V. (Univ. Liverpool, England): LEAD POISONING IN CHILDHOOD TREATED BY THE SUBCUTANEOUS ADMINISTRATION OF A CHELATING AGENT. Archives of Disease in Childhood 31:321-3, 1956.

The theoretical basis of the use of $CaNa_2EDTA$ in the treatment of Pb poisoning, the incidence and causes of the disease in childhood are discussed on the basis of reported cases.

The usually recommended route, intermittent iv administration of a dose $\leqq$0.5 g/30 lb/hr, involves repeated infusions and in a plump toddler may be difficult to carry out without cutting down on veins. Although sc administration has been reported (Bessman et al, 1954), no discription in detail of the administration has been given.

The author describes the successful treatment of Pb poisoning in 2 children ~2 yr of age with $CaNa_2EDTA$ sc (0.25 g with 1500 IU hyaluronidase in 25 ml 1% NaCl solution over 30 min every 6 hr for 5 days. Blood Pb concentrations dropped from 83 and 108 μg% to 50 and 30 (normal 10-30). In 1 child urinary Pb concentration was 280 μg/l pretreatment, 700 after 2 days, and 220 after the 1st course (normal 30-80 μg/l). The spinal fluid glucose and protein concentrations, the glucosuria and amino-aciduria and the low Hb levels all returned to normal.

2916 Travers, E., Rendle-Short, J., and Harvey, C.C. (Rotherham and Mexborough Hosp., Yorks.; Univ. Sheffield, England): THE ROTHERHAM LEAD POISONING OUTBREAK. Lancet 2:113-6, 1956.

The outbreak of Pb poisoning at Rotherham in 1954 had been earlier described by Gillet (1955). In the present paper the clinical aspects are discussed and a number of cases described. Only children were affected, their ages varying from 11 mo -15 yr, and no sign of Pb absorption was found in 125 adults from the same households. The outbreak was undoubtedly due to the use as domestic fuel of scrap batteries, but poisoning was by ingestion of the residual ash and not by inhalation of fumes. Ten children were severely affected, 2 of whom died before diagnosis, and details are given of the 5 most severe cases. The findings upon examination of 140 others who appeared likely to have been at hazard are described, signs of Pb absorption being found in 50. The diagnosis of Pb absorption was established from the following indications: (1) On radiography of the long bones, at the growing ends of a shaft a dense line is visible, or in younger children a broad zone of increased density, due to the presence of closely packed trabeculae containing a Pb deposit, this being best seen at the lower end of the femur and the upper end of the tibia. Hence X-ray examination at the knee would suffice as a screening test for the purposes of a rapid, large-scale survey. (2) Anemia, with diminution both in Hb content and in erythrocyte count. (3) Punctate basophilia, with stippled cells forming 0.02% or more of the erythrocyte count gives positive evidence of Pb absorption. The stippling is not due merely to immaturity, but to a specific effect of Pb on the cytoplasm and cell membrane. (4) Coproporphyrinuria. Treatment was with EDTA given iv in 2 5-day courses, to a total dose of 12 g. The technique is described and details given of the resulting increase in the urinary excretion of Pb in 3 of the cases. In addition, Na citrate and a high Ca diet in the form of extra milk and Ca lactate together with vitamin D, were given to help in the removal of Pb from the blood and soft tissues and promote its storage in the bones until fully excreted. No acute toxic episodes have occurred among 58 cases of Pb poisoning or absorption followed up for 11 mo, but the possible effect on mental development in the severely affected patients cannot yet be assessed. (15 references)

2917 Valledor, T., Borbolla, L., Villa Campos, J., García Palacio, A., and García Otero, A. (Havana, Cuba): Intoxicación plumbica en la infancia. Recientes avances en su tratamiento. Reporte de 8 casos en dos familias. (LEAD POISONING IN INFANTS; RECENT ADVANCES IN THE TREATMENT; 8 CASES IN 2 FAMILIES.) Revista Colombiana de Pediatria Puericultura (Bogota) 16 (Special No.):173-94, 1956.

Eight cases of Pb poisoning in children aged 7 mo-9 yr were studied. There were 2 deaths by encephalitis. The others suffered varying degrees of poisoning. In the case of the one family (3 children), the source was an abandoned Pb foundry where the children played; the other family lived close to a storage battery factory and here also the children played in the yards around it. Two of them were treated with 2.5 mg BAL/kg, 4 times daily, for 2 days and 2 times/day for the next 18 days. In 4 cases 60 mg CaEDTA/kg/day, distributed in various doses over the day, were administered orally for 20 days. Tablets of 335 mg CaEDTA were used. The clinical diagnostic criterion for Pb poisoning was irritability, headache, vomiting, constipation, abdominal colics and Burton's line on the gums. Anemia, basophilic stippling, decrease of hemoglobin, glycosuria and radiologic changes of the large bones were other signs. In 7 cases EEG's were taken. Results of clinical and laboratory tests for the 8 cases were listed.

(17 references)

2918 Winters, R.W. (Univ. North Carolina, Chapel Hill): LEAD POISONING IN CHILDREN. General Practitioner 13:107-13, 1956.

The sources of Pb poisoning in children, the clinical manifestations, the diagnosis by chemical methods, and the treatment with CaEDTA are reviewed.

2919 Wolffenbüttel, E. (São Paulo, Brazil): O saturnismo em criancas. (SATURNISM IN INFANTS.) Revista Brasileira de Medicina (Rio de Janeiro) 13, No. 10:765-8, 1956.

The difficulties in the diagnosis of Pb poisoning are discussed and illustrated by cases reported by S.F. Kuvin (1956), Byers et al (1954), and Karpinski et al (1953).

2920 Wolman, I.J. (Children's Hosp.; Univ. Pennsylvania School Med., Philadelphia): HEMATOLOGY OF LEAD POISONING IN CHILDHOOD. American Journal of Medical Science 232: 688-94, 1956.

In summarizing his review, the author states that the predominant hematologic lesion of Pb poisoning is the faulty production of red cells and Hb. The developing immature erythrocyte of marrow is clearly much more susceptible to the noxious action of this intracellular poison than are the marrow cells. The Pb appears to depress the conversion of protoporphyrin into heme and to hamper the formation of stroma in some of the red cells. It has not been feasible from the recorded childhood cases to derive any generalizations with respect to significant relations between the severity of the blood change, the level of blood Pb in random test specimens, the age of patients, the duration of exposure, or the intensity or character of the constitutional symptoms exhibited. (From author's summary; 23 references)

1957

2921 Bare, C.I. (Univ. Kansas, Mo.) LEAD POISONING. A STUDY OF SUCH TOXICITY IN CHILDREN. Journal of the Kansas Medical Society 58, No. 8:544-54, 1957.

A review article with 39 references. The most common source of Pb poisoning in children is Pb-containing paint. A few cases have been due to ingestion of wax crayons and inhalation of colored chalk dust with Pb in the pigment. Some surface glazes for porcelain and pottery contain minute amounts of Pb which may be dissolved if the container is used for lemon juice, vinegar or other acids for several hours. Pb pipes used in the drinking water supply and Pb vapors occurring from the burning of discarded wooden Pb batteries have caused intoxication. The incidence of Pb poisoning in relation to the age of the children and to season is discussed. A relationship to ultraviolet light was suggested but not established. The physiological picture, symptoms, diagnosis and pathogenesis of Pb poisoning and its sequelae and treatment are reviewed.

2922 Burke, L.M.: CHRONIC LEAD POISONING. A CASE REPORT. West Indian Med. J. 6, No. 2:105-7, 1957.

A Jamaican girl 21 mo old was admitted to the University College Hospital of the West Indies with a 5-day history of vomiting, weakness and drowsiness. The symptoms and signs which are here recorded led at 1st to the provisional diagnosis of encephalitis. Later the diagnosis of Pb poisoning was established because of persistent punctate basophilia, the X-ray demonstration of marked Pb lines at the metaphysis of all bones of the hands, wrists and knees, and the finding that the urine contained 48 ppm of Pb. Treatment by CaEDTA (300 mg iv daily for 5 days and later 600 mg daily by mouth for 9 days) was effective in bringing about great improvement in the mental and general state. The source of the Pb was a smashed motor car battery with which the child had been in the habit of playing. The child's elder brother aged 3 yr though without symptoms was found to show evidence of Pb absorption on examination of blood and urine and by X ray. (From Bulletin of Hygiene 33:5, 1958)

2923 Chisolm, J.J., Jr., and Harrison, H.E. (Johns Hopkins Univ. School Med., Baltimore, Md.): THE TREATMENT OF ACUTE LEAD ENCEPHALOPATHY IN CHILDREN. Pediatrics 19:1-20, 1957.

Twenty-two boys and 14 girls between the ages of 15 and 56 mo with acute Pb encephalopathy were treated with EDTA. The disease was considered severe in 14 patients who had convulsions continuously for 24 hr or longer or remained comatose for a similar period of time. The disease was mild in 22. The drug was administered by continuous iv infusion, continuous sc infusion, intermittent sc injection, and intermittent im injection. The total dose was the same in all patients regardless of the route of administration; 75 mg/kg body weight was given within 24 hr for 5 or 7 days. Intramuscular injection of a 20% solution containing 0.5% of procaine HCl was found to be the most convenient method. The interval between injections varied from 3-12 hr. Five of the 36 patients died and 4 of the 31 survivors were considered to have severe permanent damage to the central nervous system. One of these children had recurrent encephalopathy 3 mo after the initial mild encephalopathy; recurrent convulsions occurred during the subsequent 18 mo. This was the only patient in whom reexposure to Pb occurred after the initial attack of Pb encephalopathy. One of the other 3 severely damaged patients had severe mental retardation, another had a severe behavior disorder in the presence of at least average intelligence, and the 3rd had severe brain damage superimposed on a previously acquired defect resulting from meningitis and hydrocephalus. Four patients had mild sequelae in the form of slight behavior disorders. The remaining patients, who were followed up for 12-36 mo, did not show detectable clinical abnormality. These results were compared with those obtained in 33 patients with Pb encephalopathy who had been treated at the same hospital with BAL between 1946 and 1951. While EDTA may have reduced the incidence of residual neurological damage to a certain extent, it has not significantly reduced mortality from this disease. EDTA was no more effective than BAL for quickly terminating coma, convulsions, and increased intracranial pressure in acute Pb encephalopathy. Most of the deaths occurred during the period of these manifestations. The only present hope for a further reduction in mortality from Pb encephalopathy would appear to lie in earlier diagnosis, prompt removal of the child from exposure to Pb, and careful supportive management during the first 48-72 hr of EDTA administration. This duration of the administration of the drug is required in severe cases before the high toxic concentrations of Pb initially present in tissues can be sufficiently reduced to remove the danger to life. The unpredictable and fulminant manner in which acute Pb encephalopathy may develop in children makes it necessary that patients with both severe and mild disease should be managed during the first few days of observation on the assumption that all have potentially severe cases. The first 6-12 mo after removal from exposure to Pb constitute the period of greatest risk of continuing metabolic toxicity to cerebral and other tissues, in which the concentration of Pb may remain high after an initial course of EDTA. About 25 mg of Pb was removed from the urine during the initial course of therapy with EDTA that was observed in the course of 5 days in the patients; this may have constituted only a small part of the total Pb in the body. Quantitative determinations of coproporphyrin in urine were used as the principal biochemical indication for repeated courses of chelation therapy. Prevention of reexposure to Pb in combination with repeated courses of EDTA offers hope of reducing the incidence of more subtle but equally incapacitating forms of late damage to mentality. Final conclusions with respect to such late damage to the mentality of survivors of acute Pb encephalopathy must await the reevaluation of these patients during the early school years. (22 references)

2924 Cooper, M.: PICA, A SURVEY OF THE HISTORICAL LITERATURE AS WELL AS REPORTS FROM THE FIELDS OF VETERINARY MEDICINE AND ANTHROPOLOGY. THE PRESENT STUDY OF PICA IN YOUNG CHILDREN, AND A DISCUSSION OF ITS PEDIATRIC AND PSYCHOLOGICAL IMPLICATIONS. Springfield, Ill., Thomas, 1957, 114 pp.

After an extensive historical survey of pica in Europe and the Americas, the author discusses original observations concerning problems occurring in Negro as well as white children of low socioeconomic urban areas in Baltimore totalling 784, 172 of whom (21.9%) had a record of pica. (All children under the age of 7 mo, ie, before inception of crawling, were excluded from the study.) Compared to the non-pica group, the incidence of illness in the pica children (16% in Negro, 17.9% in white) was significantly higher than in the non-pica children (9.5% in Negro, 8.1% in white). Cases of methyl salicylate poisoning and Pb poisoning, occurring in the pica group in 2 cases each (medical histories were not obtained on all children) are not mentioned in the non-pica group although one case of convulsions (etiology not specified but probably not Pb-induced) is included in the latter group. The author states that although the reporting is probably not complete, it nevertheless points to the pica group as the one carrying the heavier burden of disease and physical defect. The average number of behavior problems per child in the pica cases was 4.4 for Negro, 4.5 for white (total 4.4); for non-pica, 3.5 for Negro, 4.0 for white (total 3.7), an increase of problems in pica children statistically not significant, the slight difference easily attributable to the greater incidence of feeding problems in the pica group. Comparison of intelligence tests between the 2 groups showed no essential difference in mental status (2% of the pica children scored lower than the non-pica children). There was a marked preponderance of Negro children over white in the total group with pica (10.4%, SE ±2.94). Boys scored slightly higher in incidence than girls.

Of all the pica cases in the present study, 15.1% showed some paint ingestion. If, as the study suggests, pica is indeed a symptom of poor nutrition (which, in turn, gives rise to anemia), etiologic as well as symptomatologic treatment is essential. Another factor for chewing objects may be emotional neglect of a child or lack of play opportunities or insufficient interaction with parents, siblings, etc, in which the condition is not true pica but closely related to it. The survey also discusses adult pica, occurring in Negro mothers.

The author proposes 2 further studies: (1) an inquiry among private pediatric patients as to the possible incidence of pica in various socioeconomic groups; (2) a study of a representative group of antepartum patients to discover the presence or absence of pica among them for studies of hemoglobin and nutritional status.

2925 Davidson, W.S. (Commission of Public Health, Western Australia): LEAD POISONING IN NINE MEMBERS OF A FAMILY. Lancet 2:1096-7 (Nov. 30), 1957.

A family of 11 members (husband, wife age 33 yr, 9 children 8 wk-14 yr) had lived for 4 mo in a galvanized iron shack in which the previous owner had broken down old car batteries to recover Pb. The family had spread the Pb oxide which had been left in a heap, over the earth floor. The sand from the floor was analyzed and found to contain 16% Pb as Pb salts and dust from the rafters contained 8.5% Pb. All except the husband and eldest boy, who had spent little time in the shack, showed signs of varying degrees of Pb absorption and Pb poisoning, such as abnormal values for Hb, stippled cell count, red cells, Pb and coproporphyrins in urine. Pb lines were noted on gums and bones, the latter proportional to the age of the patient and rate of growth of the bones. The author points out that the presence of red cells in the urine may be an important indication of Pb poisoning. Treatment with 60 mg/kg body weight/day of $CaNa_2EDTA$ led to recovery; only 1 boy (age 15 mo) still showed a few erythrocytes in the urine after 6 mo.

2926 Giannattasio, R.C. (New York): THE MANAGEMENT OF LEAD INTOXICATION. New York State Journal of Medicine 57, No. 12: 2394-6, 1957.

The author reviews his previous reports on 18 cases (14 mo-3-1/2 yr of age) of Pb poisoning and discusses the fate of Pb in the body following the acute phase and following the action of BAL. In 8 cases of acute Pb encephalopathy treated initially with Ca, inorganic P and vitamin D, roentgenograms of the long bones revealed that the Pb deposits during the following 4-12 mo were increasing rather than decreasing. However, after subsequent BAL treatment the Pb deposits in these areas steadily diminished. His theory of the fate of Pb and effects of BAL are as follows: After Pb poisoning without subsequent treatment only negligible amounts of Pb are excreted by the urine. When left to its own devices nature seems to prefer to store Pb in the bones rather than to excrete it in the urine. In some acute cases of Pb encephalopathy, after treatment with BAL, Pb seemed to increase in the bones. The author points out that in the acute phase BAL will mobilize, bind and transport out of the body as much Pb as possible while the excess streams to the bones. Or it may be that Pb in brain, blood and other tissues is more accessible to BAL than that in the bones and that the increased amount of Pb in the urine during the acute phase derives from these sources. Continued action of BAL will eventually send the Pb from the bones to the urine and in chronic cases, BAL actually removed Pb from the bones. Prompt treatment with BAL in all cases is advised since BAL appears to be a safe therapeutic agent. (11 references)

2927 Gillet, J.A. (Civic Center, Dagenham, England): LEAD POISONING. Letters to the Editor. Lancet 2:1231 (Dec. 14), 1957.

"Dr. Davidson, in his article of Nov 30, accepts almost by implication that the route of absorption of the Pb from the remnants of broken-down car batteries was inhalation. In the Rotherham outbreak, on which you published my findings, I postulated the theory that the absorption of Pb from a similar source was due to ingestion and suggested that the careless food hygiene of the affected children was responsible for this. I wonder whether Dr. Davidson has any evidence that this was the route of entry in his cases."

2928 Jenkins, C.D., and Mellins, R.B. (Chicago Board Health, Ill.): LEAD POISONING IN CHILDREN. A STUDY OF FORTY-SIX CASES. A.M.A. Archives of Neurology and Psychiatry 77, No. 1:70-8, 1957.

In 1953 and 1954, 46 children were hospitalized in Chicago with chronic Pb poisoning; 90% of them were 1-4 yr old and were mostly from poor families. All of them showed pica and dried peeling paint was usually the noxious agent. Of the 46, 43 children were first hospitalized with the severe or acute phase from May-October. Most had a characteristic premonitory syndrome of fatigue, extreme irritability, fearfulness, etc, followed by severe stage, which included coma, convulsions, and in some partial paralyses. Thirteen died and the surviving 33 were studied psychologically. The results showed that 27 were mentally retarded and in 20 of these the retardation was directly traceable to Pb poisoning. One case could not be followed. Only 5 of the survivors were of normal intelligence. Speech was impaired in 18; most children developed emotional instability and became very distractible. Some had behavior problems before the poisoning.

Two years after their illness 14 of these children were tested a second time. The 2nd year of convalescence was one of recovery in some of the cases (<50%). However, the trend was not complete enough to warrant optimism. Prevention of Pb poisoning is the only adequate solution.

2929 McLaurin, R.L., and Nichols, J.B., Jr. (Univ. Cincinnati, O.): EXTENSIVE CRANIAL DECOMPRESSION IN THE TREATMENT OF SEVERE LEAD ENCEPHALOPATHY. Pediatrics 20:653-67 (Oct.), 1957.

Over the period 1947-1956 the diagnosis of Pb intoxication was made in 52 patients admitted to Cincinnati General Hospital. Of these 52, in only 18 cases there was no evidence of involvement of the central nervous system. The diagnosis of Pb encephalopathy was made in 34 cases and only when there was definite evidence of involvement of the nervous system. Irritability and drowsiness were not considered reliable. The occurrence of seizures, however, is of significance in this regard. Except for 1 case, this was usually substantiated by the finding of an elevated concentration of protein in the spinal fluid which was analyzed and recorded in 29 of the 34 cases. Prior to the use of massive cranial decompression 20 patients with encephalopathy were admitted and later another one who was treated but not according to the prescribed method. Of these, 13 died (62%).

The 7 cases described here had reached a critical stage for whom surgical decompression was necessary; they were among 13 patients with encephalopathy treated during the past 3 yr. Their ages were 18 mo-4 yr. The technique of the massive bilateral decompression and subsequent treatment is described in some detail. There were 2 deaths (15%). In 1, gastrointestinal hemorrhage was the cause. Two survivors were mentally retarded. The authors conclude that the decrease in mortality in these cases is due to extensive cranial surgery and the use of EDTA as adjunctive therapeutic agent. (EDTA has been routinely used in the treatment of Pb intoxication in the last 3 yr.)

2930 Queries and Minor Notes: LEAD POISONING IN AN INFANT. Journal of the American Medical Association 164:1522 (July 27), 1957.

Whether a 17-mo-old infant can have Pb poisoning, as evidenced by Pb lines at the epiphyseal ends of the long bones, from inhalation of paint sprays was answered as follows: "It is difficult to conceive of a 17-mo-old infant having exposure to Pb through the medium of paint sprays. Few paint sprays now contain Pb, and, apart from industry, paint spraying usually is only an occasional activity. A 17-mo-old infant could have Pb poisoning, but currently the common source is scaled-off Pb paint from interior woodwork in homes. The best means for diagnosis resides in quantitative Pb determinations in blood and urine. Epiphyseal line abnormalities may be present but are not diagnostic of Pb deposition. Similar X-ray disclosures may arise in healing rickets and in connection with restoration of Ca level after other nutritional disorders. If the epiphyseal line abnormalities are present and if an exposure to Pb has been established, then such bony changes could result from the deposition of Pb compounds in the epiphyseal areas. In addition, some changes may arise at the margins of the flat bones. Rings of modified bony density may appear in the ossification centers of cartilage. The intensity or breadth of the bands or lines is influenced to some degree by the duration of Pb exposure and the quantity of Pb taken into the body. Diagnostic methods other than these X-ray changes should be pursued."

2931 Wilzbach, C.A. (Health Commission, Cincinnati, O.): LEAD POISONING IN CINCINNATI. Cincinnati Journal of Medicine 38:462-3 (Nov.), 1957.

Health Department records in Cincinnati list 12 cases of Pb poisoning from January through September 1957, 3 of which were fatal. During 1956, 16 cases with 2 fatalities were reported. Usually, the patients are children under the age of 4 yr. Whenever a case of Pb poisoning is reported, the Health Department dispatches immediately an investigator who inspects the sanitary conditions, the plumbing for Pb water pipes and sewage disposal system of the home involved and obtains samples of peeling paint and cracked plaster. The information and samples are analyzed in the Kettering Laboratory and the results are then reported to the physician in charge. On the basis of the reports of the Health Department, the Laboratory, the Social Worker and the Nurses, an opinion is formed as to the tentative causative agent.

2932 Woolley, P.V., Jr. (Children's Hosp. of Michigan, Detroit): LEAD POISONING DURING INFANCY AND EARLY CHILDHOOD. American Journal of Roentgenology, Radium Therapy and Nuclear Medicine 78, No. 3:547-9, 1957.

The development of diagnostic aids in Pb poisoning is discussed and the variations in the clinical manifestations at different stages of life are pointed out on the basis of the literature. A small child can ingest appreciable amounts of Pb without dramatic clinical manifestations until sunlight is introduced which accelerates absorption and probably alters certain metabolic responses. The recognition of the Pb line at the ends of growing bones in infants and small children proved to be an important diagnostic tool in pediatrics. Poisoning in childhood is usually due to ingestion of paint from toys and furniture. The frequency of death during the acute phase of poisoning could generally be ascribed to strong intracranial pressure which characterized the meningoencephalopathy. X-ray tests showed suture lines literally torn apart. Some children who recovered from Pb poisoning exhibited overt residual damage of the nervous system, personality difficulties and alterations in behavioral development. Porphyrinuria and coproporphyrinuria offer a simple and rapid biochemical screening test. Therapy is based on either increasing the amount of Pb deposited as inert phosphate or binding the active fraction and encouraging its excretion. The 2 most frequently and successfully used antidotes are BAL and $CaNa_2EDTA$.

1958

2933 Anonymous: LEAD AND CHILDREN. Transactions of the Association of Industrial Medical Officers 8, No. 1:36-8, 1958.

A discussion of the literature concerning Pb poisoning in children is presented. In closing the question is raised if Pb had ever been used for homicidal purposes, since nothing could be found in the legal literature. A BBC play, however, had a husband dispose of wife 1 by giving her Pb, and tried this on wife 2 whose symptoms did not resemble any Pb case yet met; this reminded the author of Bramwell's (1931) statement that mistakes in the diagnosis of Pb poisoning are often due to not expecting.

2934 Bradley, J.E., and Baumgartner, R.J. (Univ. Maryland, Baltimore): SUBSEQUENT MENTAL DEVELOPMENT OF CHILDREN WITH LEAD ENCEPHALOPATHY, AS RELATED TO TYPE OF TREATMENT. Journal of Pediatrics 53:311-5 (Sept.), 1958.

A comparative study of several areas of intellectual functioning in 2 groups (total 18) of Negro children treated either with BAL or EDTA in the past 5 yr is presented. All patients satisfied the criteria for Pb encephalopathy: convulsion, lethargy or irritability, a pica history, blood Pb values >0.05 mg% (0.052-0.53%), radiographic evidence of heavy metal intoxication. The 9 treated with BAL (mean age 29 mo at hospitalization, and administered 3 mg BAL/kg for 12 days) were classified as follows: 3 severely ill, 6 moderately severe. Those treated with EDTA (mean age 26 mo, and given 1 g EDTA/15 kg iv for 5 days) included 4 severely ill and 5 moderately severe. The interval between hospitalization and the follow-up averaged for the BAL group, 3.77 yr (range 3-5 yr) and for the EDTA group, 3.0 yr (2-4 yr). The results of the IQ tests (Binet and Goodenough) when the children of the BAL group were of mean age of 5.74 and the EDTA group 5.1 yr, showed means for the 2 tests of 89.55 and 79.88, and 98.88 and 101.55, respectively for the 2 groups. It appeared those treated with EDTA were superior on visual motor tests which were significantly better than chance expectancy, although no significant differences were found between ratings of both groups in general intelligence which was within normal range.

The authors conclude that though it is suggested from the study that EDTA may be more effective in reducing undesirable psychological residuals, the possibility for their occurrence remains despite the type of treatment.

2935 Bradley, J.E., and Bessman, S.P. (Univ. Maryland School Med., Baltimore): POVERTY, PICA, AND POISONING. Public Health Reports 73:467-8 (May), 1958.

The incidence of Pb poisoning in children due to ingestion of peelings and flakes of paint as studied in Baltimore is reviewed (Bradley et al, 1956; Bessman et al, 1954). Since the disease is essentially environmental, a concerted effort of physicians, nurses and social workers is required. The danger of Pb encephalopathy, resulting in neurological sequela, mental retardation or death is pointed out.

2936 Cann, H.M., and Verhulst, H.L.: EDATHAMIL CALCIUM-DISODIUM (EDTA) IN LEAD POISONING. Tennessee Industrial Hygiene News 15, No. 1:3-4, 1958.

Oral administration of EDTA in Pb poisoning in children cannot be considered a substitute for prevention of exposure to Pb. EDTA acts as a clinical "deleading" agent; but the process of "deleading" does not seem to be the only factor involved in the treatment of Pb poisoning. EDTA has not significantly reduced mortality from Pb poisoning. Compared to BAL, it seems to be more effective in reducing the incidence of residual neurological damage, but it is no more effective than BAL in terminating the acute episode of Pb encephalopathy. EDTA blocks Pb that is continually released by tissues into the extracellular fluids. A period of 48-72 hr of EDTA administration is necessary to reduce lethal concentration of Pb in the body to less toxic levels. The drug may be given by continuous iv route of a 2% solution or by intermittent intramuscular (im) injection in a total dosage range of 50-75 mg/kg body weight/24 hr for 5-7 days. Oral administration of EDTA is not as satisfactory as parenteral administration and may be harmful. Im instead of iv administration of EDTA helps in minimizing fluid intake. (Reprinted from National Clearinghouse for Poison Control Centers, Dec. 1957)

2937 Caputi, S., Jr. (Rhode Island Hosp., Providence): TREATMENT OF LEAD POISONING WITH CALCIUM DISODIUM VERSENATE; A CASE REPORT. Rhode Island Medical Journal 41, No. 6:321-2, 325, 1958.

A 2-yr-old female infant who was known to have chewed paint from the walls of a closet, was hospitalized. She had shown evidence of a moderate pica for 2 mo prior to admission and had been vomiting for ~3 wk preceding admission to the hospital. The child was listless. Examination revealed pallor of the mucous membranes of the mouth and of the conjunctivae. No gingival Pb line was found but there was a questionable Pb line circumferentially around the anal mucosa. Blood tests showed many cells with basophilic stippling, hypochromia and moderate achromia. A dose of 0.33 g $CaNa_2EDTA$ in 5% glucose and water was injected iv twice daily for 3 days and the same treatment was repeated after a rest period of 3 days for 2 more days. Improvement started immediately; coproporphyrin excretion increased from 0.65-1.80 mg/l after 1 day's treatment. The mechanism of the action of EDTA is discussed. On the basis of literature it is pointed out that though Pb is adequately removed from soft tissues, it is only partially mobilized in the skeletal components. There is evidence that Pb may be deposited in the bone marrow which suggests that further attacks of chronic Pb poisoning might occur. (10 references)

2938 Davidson, W.S. (Dept. Public Health, Perth, Western Australia): LEAD POISONING. (Letters to the Editor.) Lancet 1:51 (Jan. 4), 1958.

In a letter (Abstract No. 2927) referring to the author's article of Nov. 30 (Abstract No. 2925), Gillett asked for evidence of the route of entry of the Pb. No direct evidence was obtained. Ample opportunity for ingestion and inhalation existed. Because inhalation is generally regarded as more toxic, this route was considered more important. Some confirmation of this seems indicated by the fact that the husband and 2 elder boys who spent little time in the shack presented no evidence of Pb absorption, but the wife and younger children who spent more time in the shack did. As far as contamination of food goes, all members of the family would have been at somewhat equal risk.

2939 Greenberg, M., Jacobziner, H., McLaughlin, M.C., Fuerst, H.T., and Pellitteri, O. (Dept. Health, New York, N.Y.): A STUDY OF PICA IN RELATION TO LEAD POISONING. Pediatrics 22:756-60 (Oct.), 1958.

Since 1955, physicians have been urged to ask parents whether the child or any others in the family had manifestations of pica. If so, a careful examination with special reference to symptoms associated with Pb poisoning is made. A diagnosis of Pb poisoning is considered to be established if the Pb concentration in blood >0.06 mg/100 ml and 2 or more of the following symptoms or signs are present: gastrointestinal, neurologic, hematologic, roentgenologic. Pica cases are concentrated in the first 4 yr of age, only 4% occurring after that. In 1956-57, 12% of the pica cases occurred in infants <1 yr, without any cases of Pb poisoning among them. Pb poisoning in children leads to death in 15-25% of the cases and to neurologic disturbance in ~25% or more of those that survive. Early diagnosis is important. Cases of Pb poisoning in children who do not have pica do not add up to a significant percentage.

2940 Horner, T., and Hickling, S. (Wellington, New Zealand): LEAD POISONING OF UNUSUAL ORIGIN IN TWO CHILDREN. New Zealand Medical Journal 57:600-4 (Dec.), 1958.

Pb poisoning was diagnosed in a 5-yr-old boy with a history of vomiting, chronic constipation, anemia and a stippled cell count of 30,000/million red cells. A blood examination of the other 4 members of the family showed mild evidence of excessive Pb absorption in the father and an infant child and marked Pb absorption in another girl. Treatment with EDTA produced a marked improvement of the blood picture in these 2 children. The Pb poisoning was traced to the consumption of a citric cordial which had been kept in a jug with a Pb glaze. A quantity of the semi-dilute cordial, left to stand in the jug for 18 hr, upon analysis showed a Pb content of 400 ppm.

2941 Jacobziner, H., and Raybin, H.W. (New York City Dept. Health; Poison Control Center, N.Y.): PUBLIC HEALTH ASPECTS OF LEAD POISONING IN INFANCY AND YOUNG CHILDREN. New York State Journal of Medicine 58, No. 5:730-4, 1958.

The following incidents of Pb poisoning were reported to the New York City Poison Control Center: Five cases of children, 6 mo-2 yr old, who had eaten paint and plaster for unknown periods of time without the parents being aware of it. The children exhibited abdominal pains, vomiting and fever, in some cases diarrhea, cyanosis stupor and convulsion; all recovered. A 6th child, 2-yr old, died 24 hr after admission to the hospital.

2942 Jacobziner, H., and Raybin, H.W. (Dept. Health, New York City; Poison Control Center, N.Y.): LEAD POISONING IN INFANCY AND YOUNG CHILDREN. New York State Journal of Medicine 58, No. 6:897-9, 1958.

Two case reports of Pb poisoning are given: (1) A 19-mo-old male child used to chew on the paint of the window sill while looking out of the window. The child had no symptoms until he developed convulsions 4 days prior to his death. (2) A 2-yr-old male child who had a habit of eating paint from the window sills developed vomiting and abdominal pains. A diagnosis of Pb poisoning was not made until after the 3rd hospital admission when he developed convulsions and coma. General symptoms of Pb poisoning, seasonal and geographical incidence and treatment are discussed.

2943 Landing, B.H., and Nakai, H. (Children's Hosp.; Univ. Cincinnati, Coll. Med., O.): HISTOCHEMICAL PROPERTIES OF RENAL LEAD-INCLUSIONS AND THEIR DEMONSTRATION IN URINARY SEDIMENT. American Journal of Clinical Pathology 31:499-503 (June), 1958.

Sloughed renal tubular epithelial cells containing intranuclear inclusions can be demonstrated in urinary sediment of children with acute Pb poisoning by means of staining smears of sediment with hematoxylin and eosin or H_2SO_4-permanganate aldehyde-fuchsin. Histochemical analysis of renal Pb inclusions suggests that they are composed largely of protein with a high content of cysteine of other sulfhydryl groups. (From authors' summary)

2944 Popescu, I.G., Ioanid, N., Radian, I.S., Bors, G., Popa, I., and Berechet, A.: (PLACENTAL PERMEABILITY IN SATURNISM.) Farmacia (Bucharest) 6:413-22, 1958.

Description is given of the result of a pm examination of a newborn child whose mother had suffered from a longstanding saturnism. Massive parenchymal lesions of the spleen and kidneys and less in the placenta, lungs and brain were observed. Quantitative Pb determinations were made polarographically and colorimetrically after mineralization. The Pb is conveyed to the fetus via the placenta and is fixed in fetal organs without being accumulated in organs performing antitoxic functions. (From Chemical Abstracts 53:14325, 1959)

2945 Robinson, M.J., Karpinski, F.E., Jr., and Brieger, H. (Jefferson Med. Coll., Philadelphia, Pa.): THE CONCENTRATION OF LEAD IN PLASMA, WHOLE BLOOD AND ERYTHROCYTES OF INFANTS AND CHILDREN. Pediatrics 21:793-7 (May), 1958.

The concentration of Pb in the blood of 103 children, 5 hr-13 yr old, without history of Pb poisoning, was studied. No relation to sex or race was detected. For the purpose of evaluating the role of age, the subjects were divided into 3 groups ranging from (1) 5 hr-6 mo, (2) 6.1 mo-4 yr and (3) 4-13 yr. The values obtained for group 1 were significantly lower than those for groups 2 or 3; ranges and medians for groups 2 and 3 were practically identical. Median values in group 1 were 0.015 mg Pb/100 ml of whole blood (range 0.005-0.031) and 0.034 mg/100 ml of erythrocytes (range 0.010-0.090). Newborn infants had 0.007-0.028 mg Pb/100 ml in whole blood and 0.010-0.044 mg/100 ml in erythrocytes. Concerning the question of transport of Pb from the maternal into the fetal circulation it is assumed that minute amounts of Pb are carried by the maternal plasma into the fetus. In the combined groups 2 and 3 ranges and median values were as follows; in mg/100 ml: whole blood 0.003-0.054, 0.27; erythrocytes 0.003-0.144, 0.065; 90% of the values were between 0.015-0.040 for whole blood and 0.028-0.103 for erythrocytes. (20 references)

2946 US Public Health Service: LEAD POISONING IN CHILDREN. US Public Health Service Publication No. 586, 1958, 2 pp.

The leaflet states briefly the following: the dangerous age; how children get poisoned by Pb; signs of Pb poisoning; protective measures.

2947 US Public Health Service: THE RECOGNITION OF LEAD POISONING IN THE CHILD. US Public Health Service Publication No. 620, 1958, 8 pp.

The incidence, etiology, diagnosis and treatment of Pb poisoning in children are summarized.

2948 US Public Health Service, National Office of Vital Statistics: LEAD POISONING. Morbidity and Mortality 7, No. 14:2; No. 17:2, 1958.

In Issue No. 14, S.H. Osborn (Connecticut State Department of Health) reported the death from Pb poisoning of a 3-1/2-yr-old boy, the possible source of which was paint chewed from a crib. Samples of the original paint from the crib were found to contain Pb.

As reported in No. 17, further study showed the mother and 2-yr-old brother to have high blood Pb values (0.11 mg and 0.07 mg/100 g blood, respectively), while the father and 12-yr-old sister had normal blood Pb values. It seemed unlikely that paint from a crib was responsible, and search for the most probable source of Pb in this case was continued.

2949 Van Assen, F.J.J. (Rotterdam, Netherlands): Een geval van loodvergiftiging als oorzaak van aangeboren afwijkingen bij het nageslacht? (A CASE OF LEAD POISONING AS THE CAUSE OF CONGENITAL ANOMALIES IN THE OFFSPRING.) Nederlands Tijdschrift Verloskunde en Gynaecologie 58, No. 3/4: 258-63, 1958.

The case-history is presented of a family in which the father, after the birth of 2 healthy children, contracted Pb-poisoning. In the 3 yr that followed, 3 fetuses with lethal congenital anomalies were born and a 3-mo pregnancy ended in abortion. After treatment and change of occupation of the father, 2 healthy normal children were born. The literature is briefly reviewed. Although in this case the harmful influence of Pb was not proved due to scarcity of laboratory data, the Pb-intoxication of the husband is considered a probable cause of the anomalies. (From author's summary)

2950 Watson, R.J., Decker, E., and Lichtman, H.C. (State Univ. New York, New York): HEMATOLOGIC STUDIES OF CHILDREN WITH LEAD POISONING. Pediatrics 21, No. 1:40-6, 1958.

Thirteen children, 16-36 mo, with Pb poisoning due to the ingestion of plaster and paint were subjected to hematologic tests. The Pb concentration in their blood was ≥0.06 mg/100 ml. They exhibited a microcytic and hypochromic anemia with a mean hemoglobin of 7.6 g/100 ml, a moderate aniso- and poikilocytosis. Reticulocytes were >2% in 9 cases, with the highest value 10.8%; there was a marked elevation of free erythrocyte protoporphyrin. The findings were compared with those in nutritional Fe deficiency. (20 references)

1959

2951 Byers, R.K. (Children's Hosp., Boston; Harvard Med. School, Cambridge, Mass.): LEAD POISONING. REVIEW OF THE LITERATURE AND REPORT ON 45 CASES. Pediatrics 23: 585-603 (March), 1959.

After a review of the literature concerning Pb poisoning in children, 45 cases from the author's experience are described. All were treated with iv or im administration of EDTA. Oral administration of EDTA produced no shortening of the prolonged period of coproporphyrinuria following cessation of iv use of EDTA. In the acute stage oral use of EDTA was less efficient than iv or im administration in returning the aberrant porphyrin metabolism to normal. The conclusion was drawn that Pb interferes with porphyrin metabolism at several physiologically distinct points and that the hematopoietic marrow is not freed of Pb by EDTA. Since EDTA given orally in the presence of Pb in the intestinal tract is dangerous and even iv EDTA may promote Pb absorption from the intestinal tract and its transport to the brain, preliminary emptying of the intestinal tract by enemata is important. (From author's summary, 50 references)

2952 Cohen, G.J., and Ahrens, W.E. (Silver Spring, Md.): CHRONIC LEAD POISONING. A REVIEW OF SEVEN YEARS' EXPERIENCE AT THE CHILDREN'S HOSPITAL, DISTRICT OF COLUMBIA. Journal of Pediatrics 54:271-84 (Mar.), 1959.

Experience in the management of 43 children with chronic Pb poisoning over the period 1950-1956 (with peaks in 1953 and 1955) is presented.

The diagnoses were made on the basis of abnormal blood or urinary Pb levels prior to treatment and any of the 2 following abnormalities: pica, basophilic stippling, markedly increased transverse densities in the metaphyses of the long bones. The children were grouped as to asymptomatic (28%), with clinical symptoms without encephalitis (32%), encephalitis (40%; 8 mild and 9 severe cases). The frequency of signs and symptoms and diagnoses made on admission is tabulated as well as detailed laboratory findings.

The patients were treated with EDTA, administered either iv, or sc (30 mg/kg/day as the standard dose). In the 1st 18 cases 0.5 g was given 3 times/day regardless of weight. EDTA was given for 5 days with a 3-day "rest" period and then repeated for another 5 days. Three (7%) of the severe encephalitics died after an average of 2-1/3 days. At necropsy of 1 of them Pb analysis showed in bone, 9.96 mg/100 g; kidney, 0.8; liver, 0.78; lung, 0.10; brain, 0.0. In the case follow-up, the authors note that 1/4 of the patients were lost; all but 1 returned to their parents and previous environments.

In their conclusions and summary the authors state that the observed mortality of 7% is significantly high even if it is an improvement over earlier reports. The 45% incidence of neurologic and psychic residual morbidity found by them is pointed out for serious consideration and further study. Routine inquiry into the presence of pica may help to avoid the risk of Pb poisoning to become symptomatic. (35 references)

2953 Farber, S., ed. (Children's Med. Center, Boston, Mass.): CLINICAL PATHOLOGICAL CONFERENCE; THE CHILDREN'S MEDICAL CENTER, BOSTON, MASS. Journal of Pediatrics 55:102-12 (July), 1959.

The case of a 2-yr-old white boy who died evidently from Pb poisoning is described. The following signs were indicative of Pb poisoning: persistent vomiting, unsteady gait, changes in the spinal fluid, anemia of a type typical for Pb intoxication, coproporphyrinuria. Against the diagnosis of Pb poisoning was the report of a normal spinal fluid pressure. The diagnosis was established firmly on the basis of finding >1 μg Pb/ml of bladder urine removed at autopsy. The child developed convulsions and fever and died on the 3rd day in the hospital. The Conference members discuss whether prompt EDTA treatment would have saved the child. The need for a law against the use of Pb in house paints is pointed out. Participants in this Conference were: R.K. Byers, M.H. Wittenborg, J.M. Craig, et al.

2954 Hung, W.: LEAD ENCEPHALOPATHY IN INFANTS AND CHILDREN. Clinical Proceedings of Children's Hospital (Washington, D.C.) 15:219-26 (Sept.), 1959.

A case of acute Pb encephalopathy in a 19-mo-old girl is presented. The child was admitted to the hospital because of lethargy and vomiting. There was a history of 3 mo's pica, the patient having chewed on window sills and doors. Blood tests showed the presence of basophilic stippling; the blood Pb level was 0.41 mg/100 ml; the Pb content in the urine was 11.80 mg/1 and 4.01 mg/24 hr specimen. X-ray tests showed some condensation of the inner table in the skull and transverse lines of increased density in the metaphyses of long bones. EDTA was administered every 8 hr.

Convulsions, starting on the 3rd hospital day, were followed by sudden death. Autopsy revealed encephalopathy due to Pb poisoning (edema and vascular degeneration), cloudy swelling of the liver and bone marrow hyperplasia. A brief outline is given of the etiology, clinical and laboratory findings, diagnosis, prognosis, pathology and treatment of Pb poisoning. (24 references)

2955 Jelliff, C.R., Heidrick, P.J., Cain, J.A., and Ohlsen, J.E. (Lincoln Hastings Med. Lab., Lincoln, Nebr.): LEAD IN DOMESTIC WATER SUPPLY; LEAD PIPING AS A SOURCE OF TOXIC QUANTITIES. Nebraska State Medical Journal 44:156-60 (Apr.), 1959.

The cases of poisoning described occurred in a colored family living in Lincoln, in a 2-family house built in the early 1900's. It was found that ~30 ft of Pb pipe led into the house with ~18-in Pb pipe additionally from the meter to the house piping proper. Pb content in water, determined by the method approved by the Public health Service, was 0.4 ppm before flushing and 0.03 ppm after flushing. Several weeks later the entire Pb piping was removed; similar tests showed no significant amounts of Pb. The authors note that in their locality, Pb piping was approved until the early 30's. While much has been replaced, as of 1956 ~10,000 homes still had Pb pipe.

Those afflicted were a boy born in 1953, a girl born in 1954, and their mother, seen by the authors since 1951 (age 17). Before Pb poisoning was diagnosed, the symptoms, aside from colic, irritability, etc, were a hypochromic anemia that did not respond to treatment, anisocytosis, poikilocytosis, and marked hypochromasia. All showed severe stippling of erythrocytes, and one, "target" cells, but no Pb line on gums. Urinary coproporphyrins were positive in all cases, Pb was 0.18, 0.13, and 0.21 mg/l. The children showed the typical Pb line upon bone X ray. Inquiry revealed that the father left home in the mornings without breakfast, and that the mother used the tap water without flushing. The authors wished to investigate the other family occupying the house, where a small child had been suffering from severe colic for several months, but the family refused to cooperate.

2956 National Clearinghouse for Poison Control Centers: LEAD POISONING IN CHILDREN: DIAGNOSTIC CRITERIA. US Public Health Service, May, 1959, 8 pp.

Criteria to be used in diagnosing Pb poisoning in children are presented. Clinical and laboratory criteria, criteria for Pb absorption, and exposure to a Pb source are the 3 areas under which the diagnostic criteria fall. Two or more clinical and laboratory criteria couples with 1 or both criteria for Pb absorption enable a diagnosis of Pb poisoning to be made. Although chemical identification of the Pb source involved is important in arriving at a final diagnosis, treatment must not be delayed if the source is not readily demonstrated. A classification for final diagnosis concerning the exposure of a child to Pb is recommended. The importance of recognizing early cases of Pb intoxication and even earlier asymptomatic cases in which increased Pb absorption occurs is emphasized by the classification. Use of this classification should aid in establishing a long-term prognosis. Early diagnosis is necessary to reduce sequelae and mortality from Pb poisoning in children. (From author's summary)

2957 Roxburgh, R.C., and Haas, L. (Queen Elizabeth Hosp. Children, London, Hosp., England): THE DIAGNOSTIC IMPORTANCE OF GLYCOSURIA IN LEAD POISONING IN CHILDHOOD. Archives of Diseases in Childhood 34:70-3 (Feb.), 1959.

Three cases of Pb poisoning in children are described. They were 2 boys, 1-1/2 and 4-2/3 yr old, and a girl 6-1/4. The diagnosis of the condition was reached at an early stage after admission to the hospital because of the discovery of glycosuria, which led to further tests for Pb poisoning. The glycosuria persisted for 3 wk. There was no evidence of residual renal damage at the end of 6 mo. All 3 cases were treated with prolonged courses of oral CaEDTA resulting in prolonged excretion of Pb in the urine. Evidence is put forward to suggest that colored crayons of the yellow and orange ranges may be a danger to children on account of their content of Pb chromate. (20 references)

2958 Smith, H.D. (Univ. Cincinnati, O.): LEAD POISONING IN CHILDREN AND ITS THERAPY WITH EDTA. Industrial Medicine and Surgery 28: 148-51; discussion, 151-5 (Mar.), 1959.

Pb poisoning among children is still a serious menace. The source of the Pb nowadays is usually old paint. The illness primarily involves 1-4-yr-old children and strikes almost entirely during the summer months. During the first 10 mo of 1958, 20 instances of excessive absorption of Pb by children with 4 deaths were documented in Cincinnati. The case of a 2.5-yr-old girl is described in detail. When the child started to vomit and to become lethargic, she was taken to the hospital where a moderately severe anemia with basophilic stippling of the red cells, the presence of albumin, sugar and coproporphyrin in the urine, dense lines of radio opacity at the ends of the long bones of the forearm and large amounts of radio opaque substances in the intestinal tract were found. Although therapy with EDTA was started immediately, severe encephalopathy ensued and the child died. Postmortem analyses showed the following Pb contents (mg/100 g) in blood, liver, vertebrae and feces, respectively: 0.64, 3.81, 14.9, 31.80 (on ash.)

2959 Whitaker, J.A., and Vietti, T.J. (Univ. Texas S.W. Med. School, Dallas): FLUORESCENCE OF THE ERYTHROCYTES IN LEAD POISONING IN CHILDREN: AN AID TO RAPID DIAGNOSIS. Pediatrics 24:734-8 (Nov.), 1959.

Red fluorescence of erythrocytes occurs during Pb poisoning. The authors examined microscopically with the aid of blue ultraviolet light a thin wet-preparation of erythrocytes obtained from 7 untreated children with Pb poisoning, aged 15-36 mo. In every one of these children the red fluorescence was observed in 75-100% of the erythrocytes. The exact nature of the fluorescent material in the erythrocytes has not been determined; it is probable that the fluorescence is related to the amount of free protoporphyrin in the erythrocytes. Control specimens (150) obtained from normal children and others with various clinical conditions also were examined microscopically and showed 0-50% fluorescent erythrocytes. The authors consider this test a simple, rapid and reliable method to aid in the diagnosis of Pb poisoning in children.

1960

2960 Anonymous: THE LEAD DETECTIVES ARE AT WORK IN CINCINNATI. Journal of the American Medical Association 172:1527 (Apr. 2), 1960.

The Organization of a Lead Information Center in Cincinnati is described. The agency was set up with the purpose to coordinate the activities of all community elements engaged in diagnosis, treatment and prevention of Pb poisoning, because of an increase of cases (1 fatal case of encephalitis in 1946, but 72 cases of Pb poisoning with 5 deaths in 1959. This has been due to greater awareness of the problem.) Whenever a case of suspected Pb poisoning is reported, the city health department sends a nurse and a sanitarian to the child's home and blood specimens from the patient and paint samples are sent for analysis to the Kettering Laboratory. In addition to its day-to-day operations the Center is hard at work on model laws that will prohibit use of Pb-containing paints in house interiors. Meanwhile labeling of all paints containing >1% Pb and local ordinances compelling removal of Pb-base paints in homes where Pb poisoning has been detected, are advocated.

2961 Beaudoing, A., Guilhot, J., and Fayan, L.: Intoxication saturnine d'origine hydrique chez une fillette. Action favorable des chélateurs. (LEAD POISONING OF AQUEOUS ORIGIN IN A YOUNG GIRL. FAVORABLE ACTION OF CHELATING AGENTS.) Pediatrie 15:667-70, 1960.

Pb intoxication of aqueous origin in children is not very frequent, and because it is exceptional in French publications on Pb intoxication in children the authors presented this case of a 7-yr-old girl. The patient had no noteworthy antecedents but suffered from severe abdominal pains and repeated vomiting since July 28, 1959. Considering a catarrhal infection, she was treated symptomatically. She improved for 5 days but as gastric pains recurred with vomiting, she was hospitalized on August 4. Since there was no improvement and her state of dehydration became worse, she was given many perfusions per day. Because of many similarities with Pb intoxication symptoms in adults, a possible Pb poisoning diagnosis was made on the basis that the girl regularly spent 1 mo/yr in an otherwise uninhabited home in the country. Drinking water was obtained from a well and only this water was used. It was led by Pb pipes to the kitchen sink and the girl drank many times a day directly from the faucet because of the heat.

Laboratory findings showed the following: urinary coproporphyrins +++; urinary Pb level: 138 µg/100 ml (according to English authors, upper limit of normal, 60 µg); Pb content in the water: 180 mg/l. She showed moderate anemia and no basophilic stippling was seen. Opaque lines seen in bone X rays gave but vague indication. Treatment with CaNa$_2$EDTA was begun on the 4th day of hospitalization. A 2 ml or 0.1 g diluted in a 50 ml isotonic serum-glucose solution was administered by iv infusion (2-3 hr) for 4 successive days. The patient improved very rapidly and left the hospital after 8 days.

The observation is thought to be worthy of interest because 4 factors seemed involved: (1) Stagnant water in a Pb main for 11 mo (in 1957 as much as 800 mg Pb/l was found in a similar experiment in Paris). The well was located near a farm so probably contained nitrates and chlorides which change into Pb nitrates and Pb chlorides which are very soluble. The water in the region is very poor in Ca so no protective cover of Pb carbonates could be formed. There was contact between the water main and an electric cable which favored dissolution of Pb electrolytically. (2) In the absence of precise etiologic information initially, the almost peritoneal aspect could have resulted in a surgical diagnosis. (3) Concerning therapy, EDTA administration should not exceed 4-5 days; it appears to have better results with repeated treatment some days or weeks later. In the case described the administration was not repeated. The authors conclude with the question whether Pb intoxication from water is not less infrequent than it is thought to be.

2962 Benson, P.F., and Chisholm, J.J., Jr. (John Hopkins Univ. School Med.; Baltimore City Hosp., Md.): A RELIABLE QUALITATIVE URINE COPROPORPHYRIN TEST FOR LEAD INTOXICATION IN YOUNG CHILDREN. Journal of Pediatrics 56:759-67 (June), 1960.

A qualitative technique is described for urine coproporphyrin (CP) estimation, (based on Schwartz's et al method 1951, the de Langen and ten Berg's method, (1948, in which CP is determined in ether extracts of urine) having appeared to be unreliable in the hands of the authors). The method, described in detail, involved CP extraction.

It was then applied to the study of 258 children, 8-63 mo old, from June 1958-June 1959. Among them, 44 had acute poisoning, 52 had increased absorption of Pb but were asymptomatic, and 162 showed no evidence of increased Pb absorption according to previously published criteria. No cases with a previous Pb poisoning history were included. A specimen was taken from each child and tested for CP within 15 min of voiding. A blood sample was taken and the blood Pb concentration was determined by a wet-digestion dithizone technique.

Some principles of porphyrin analysis are discussed and evidence is presented to show that estimation of CP in initial ether extracts is not reliable. In using the reported technique, a positive CP result (+++ or ++++) was present uniformly in patients with whole blood Pb levels >0.10 mg/100 g, although in a number of the patients the abdominal and long bone X rays were negative for Pb intoxication and the history of pica was denied. (16 references)

2963 Deutschberger, O.: REPORT ON THE INCREASE

OF LEAD POISONING AS REVEALED BY LABORATORY AND X-RAY EXAMINATIONS. 2. RADIOLOGICAL ASPECTS OF LEAD POISONING. Proceedings of the Rudolph Virchow Medical Society in the City of New York 19:13-5, 1960.

The incidence of Pb intoxication in children and its differential diagnosis through radiological detection of osteosclerotic changes are discussed. The author points out that the skeletal changes, although characteristic, are not pathognomonic of Pb poisoning, for P, Sr or Bi besides Pb may be responsible for the osseous changes. Also F and vitamin D may cause bone changes resembling heavy metal osteopathies although the bone involvement is more diffuse. The conclusion is that if osteosclerosis of the metaphyseal end of the long bones is the only striking change, the probability of heavy-metal osteopathy should be considered. Such findings, even without any supporting history, should induce a clinical and laboratory investigation, in order to establish a definite diagnosis of Pb intoxication.

2964 Gowing, J., and O'Connell, R.R. (Woman's Med. Coll. Pennsylvania, Philadelphia): FATAL LEAD POISONING. Journal of the American Medical Women's Association 15: 275-6 (Mar.), 1960.

A 17-mo-old Negro girl, when admitted to the hospital with convulsions, had a blood count as follows: hemoglobin 9.0 g, hematocrit 30%, leukocytes $15{,}750/mm^3$. The mother stated that her only previous seizure had come on 1 mo before and had lasted a short time. When symptomatic treatment failed, CaEDTA was given intravenously on the 2nd day. The child died the following day after a 2nd dose of EDTA. Autopsy showed a Pb content of 0.92 mg/100 ml in the brain but no edema was present. Blood analysis, returned after the child's death, gave a Pb level of 184 µg which, corrected to a hemoglobin level of 15 g, would give 478 µg. The case illustrates that advanced Pb poisoning can be almost asymptomatic.

2965 Hartman, E.E., Park, W.E., and Nelson, H.G. (Health Dept., Minneapolis, Minn.): THE PEELING HOUSE PAINT HAZARD TO CHILDREN. Public Health Reports 75:623-9 (July), 1960.

Between August 25, 1958, and October 10, 1959, a total of 417 specimens of urine from children (5 yr and under, without symptoms of Pb poisoning) were analyzed for Pb at the Minneapolis Health Department laboratory. Of 393 samples obtained through a screening program in well-child clinics, 7 showed high urinary Pb (>0.08 mg/l). Of the remaining 24 samples obtained from children living in houses selected for study because of their obviously peeling paint, 9 were found to be high in Pb content. Screening through the well-child clinics lasted nearly 14 mo, but the study in the preselected homes was carried out only during July-September.

All of the specimens with high urinary Pb were associated with peeling exterior house paint, except for 2 cases found through the well-child clinics. In these, the source of Pb was traced to Pb dust brought home on the clothing of 2 adults who worked in a storage-battery manufacturing plant. When the figures of the 2 studies were combined, 14 out of 29 children living in 19 houses with peeling paint had high urinary Pb levels. All of these 14 children were believed to have ingested the Pb although only 3 had a definite history of pica. The children played in the dirt adjacent to the houses where peeling paint had fallen into the play areas. None of the children with high urinary Pb manifested sufficient signs or symptoms to warrant a diagnosis of Pb poisoning and by late October, almost all urinary levels had returned to normal.

Since all of the high urinary Pb levels appeared during the summer, a seasonal outdoor exposure and the absence of significant all-year inside exposures were suggested.

2966 Jacobziner, H., and Raybin, H.W. (New York Dept. Health; Poison Control Center, New York): LEAD POISONING IN YOUNG CHILDREN - FATAL AND NONFATAL. New York State Journal of Medicine 60:273-7 (Jan. 15), 1960.

Brief reports are presented on 10 cases of Pb intoxication (all but 1 nonwhite) caused by pica in children (age 1.5-4 yr) one of which was fatal. All lived in substandard housing and in nearly all cases parents were unaware of the hazards. Although some of the children were asypmtomatic, at the time of admission the blood Pb levels were elevated in most cases. The authors conclude by recommending that an inquiry about pica be made a routine part of history taking, particularly in children.

2967 Jakoby, R.K. (George Washington School Med., Washington, D.C.): INCREASED INTRACRANIAL PRESSURE IN CHILDREN NOT DUE TO AN EXPANDING LESION. Medical Annals of the District of Columbia 29:679-82 (Dec.), 1960.

The 4 cases described include 1 of Pb poisoning in a 2-yr-old boy who had a 3-mo history of vomiting, weight loss, etc, and showed lethargy, papilledema, nuchal rigidity, and right-sided convulsions. X rays of the long bones revealed Pb lines, and the abdomen showed metallic densities. Skull and chest films were normal. Blood analyses showed hematocrit 35%; white blood cells 13,500; Pb in serum, 0.24 mg/100 ml; the urine contained coproporphyrins which disappeared only after 2 courses of CaEDTA, on the 30th day of admission. Recovery was complete after 38 days.

2968 Katz, R.A. (Children's Med. Center, Boston, Mass.): INTRAVENOUS UREA IN THE THERAPY OF INCREASED INTRACRANIAL PRESSURE WITH LEAD ENCEPHALOPATHY. New England Journal of Medicine 262:870-2 (April 28), 1960.

The case of Pb poisoning, due to ingestion of paint peelings in a 5-yr-old girl is described. The child developed symptoms of respiratory infection, vomiting, lethargy and clonic seizure. Treatment with EDTA was started and, in order to reduce the pressure of the cerebrospinal fluid, 30% urea in 10% invert sugar (1 g urea/kg of body weight) was infused at the rate of 3 ml/min. Marked diuresis followed and the pressure became normal.

A review is given of the literature concerning the effectiveness, mode of administration and mechanism of action of hypertonic urea. (17 references)

2969 Kline, T.S. (Michael Reese Hosp., Chicago, Ill.): MYOCARDIAL CHANGES IN LEAD POISONING. A.M.A. Journal of Diseases of Children 99:48-54 (Jan.), 1960.

Five case reports are presented to draw attention to the myocardial involvement in childhood Pb poisoning. The myocardial lesions per se seem to have been responsible for the death of 2 of the 5 patients and certainly were contributory to the death of the 3 others. At autopsy evidence of Pb encephalopathy was found in all, in addition to chronic myocarditis. The latter was characterized by interstitial fibrosis with a serous exudate and relatively few inflammatory cells. Routine electrocardiographic studies and close scrutiny for possible clinical evidence of myocardial damage is urgently recommended.

2970 Mosser, R.S., and Bessman, S.P.: LEAD EXCRETION FOLLOWING ORAL DL-PENICILLAMINE WITH A METHOD FOR COMPARING THE RELATIVE EFFECTIVENESS OF CHELATING AGENTS ON THE EXCRETION OF LEAD. Bulletin of the School of Medicine University of Maryland 45:47-9 (July), 1960.

Oral penicillamine (40 mg/kg) was much less effective than CaEDTA (1 g/day) parenterally, in the treatment of 2 children with Pb poisoning, 8 and 12 kg weight. Penicillin itself had no effect on the urinary excretion of Pb.

2971 Teuber, M.D., and Bradley, J.E. (Univ. Maryland, Baltimore): ACUTE VERSENATE NEPHROSIS OCCURRING AS THE RESULT OF TREATMENT FOR LEAD INTOXICATION. Journal of the American Medical Association 174:263-8 (Sept. 17), 1960.

A 1-yr-old girl with acute Pb poisoning developed anuria and uremia 5 days after treatment with CaEDTA (125 mg kg of body weight daily for 3 days). Her clinical course was complicated by pneumonia, pericarditis, and bleeding from the gastro-intestinal tract. Despite artificial dialysis she died after remaining anuric for 13 days. At autopsy the kidneys showed acute tubular necrosis, which was attributed to the CaEDTA therapy. It is recommended that the dosage of CaEDTA should not exceed 75 mg/kg body weight. Similar cases have been reported in the German literature and also following the treatment of hypercalcemia with $Na_2CaEDTA$ in US. It is believed that the tubular and glomerular changes result from the excretion by the glomerulus and reabsorption by the proximal convoluted tubule of CaEDTA or some metabolite of that drug. (From authors' summary)

2972 Schwerd, W. (Univ. Erlangen, Germany): Bleibefunde bei tödlichen Bleivergiftungen. (LEAD FINDINGS IN FATAL LEAD INTOXICATIONS.) Archiv für Toxikologie Fühner-Wieland's Sammlung von Vergiftungsfällen 18:177-86, 1960.

The case of a 5-yr-old boy who was admitted to the hospital with abdominal cramps and colic was reported. The child was treated for hemolytic anemia, dismissed after 4 wk, but had to be readmitted 1 mo later. He showed a Pb line at the base of the teeth, basophil stippling and density at the metaphyseal margins of long bones, and died in spite of immediate treatment. On the basis of the literature, the Pb content in blood, lungs, heart, liver, spleen, kidney, stomach, intestines, urine, brain, muscle, pancreas and bones in 15 subjects (Pb exposed and controls) was tabulated. Pb concentrations in the liver >0.15 mg% are considered as pathologic but Pb intoxications are usually not fatal until the Pb level in the liver exceeds 1 mg%. A high Pb content in the intestines and in the liver indicates acute intoxication while in chronic poisonings the Pb concentration in the liver is usually <1 mg%. The Pb concentration in the bone is indicative of the duration and intensity of the Pb absorption. The author points out that generally there is no sharp demarcation between normal and abnormal Pb content in organs.

2973 Seganti, A., Anibaldi, A., and Borra, G. (Univ. Rome, Italy): (LEAD ENCEPHALOPATHY IN AN INFANT.) Archivio italiano di pediat. e puericolt. (Bologna) 20, No. 4: 251-63, 1960.

Pb poisoning occurred in a 6-mo-old infant due to prolonged use of a Pb-containing ointment or lotion for the mother's nipples. It is believed that Pb was absorbed by the nipples and excreted in the milk of the mother. Intramuscular administration of CaEDTA produced clinical improvement. It is pointed out that some infants may develop subclinical forms of Pb poisoning and that the indiscriminate use of Pb containing lotions and ointments might be an etiological factor. (From Journal of the American Medical Association 173:1949, 1960)

2974 Smith, J.F., McLaurin, R.L., Nichols, J.B., and Asbury, A. (Cincinnati General Hosp., Ohio): STUDIES IN CEREBRAL OEDEMA AND CEREBRAL SWELLING. I. THE CHANGES IN LEAD ENCEPHALOPATHY IN CHILDREN COMPARED WITH THOSE IN ALKYL TIN POISONING IN ANIMALS. Brain 83:411-24 (Sept.), 1960.

The courses of 6 out of 16 reported cases of fatal Pb encephalopathy (4 colored, 2 white children) that occurred in Cincinnati from 1948-1957 are briefly described. Ages ranged from 21 mo-7 yr. In all instances, the final illness was acute and of short duration. In some, there were indications of previous episodes of less severe Pb poisoning. In all except the 7-yr-old boy in whose case the mode of poisoning was not clear, the route of intoxication was ingestion of dirt, putty, paint, etc. The dominant clinical feature was usually increased intracranial pressure and acute cerebral swelling.

The terminal episode in Case 1 (3-1/2-yr-old Negro boy) lasted 4 days with rapid rise of intracranial pressure from 140-600 mm. Positive signs of Pb poisoning were a Hb of 6.5 g/100 ml, coproporphyrinuria, Pb lines in the bones and opaque material in the abdomen. Blood level was 0.26 mg/100 ml. In Case 2 (23-mo-old Negro boy) with a history of pica), the final illness lasted >3 wk, Hb was 12.5 g, coproporphyrinuria, stippled cells and Pb lines in the bones were present. Blood Pb level was 0.22 mg/100 ml. Intracranial pressure was 530 mm, protein in the CSF: 69 mg. Patient 3, a 21-mo-old Negro boy, with a history of pica, had a CSF pressure of 240 mm, protein, 50 mg/100 ml; Pb lines in the long bones, a blood Pb level of 0.23 mg/100 ml, coproporphyrinuria and basophilic stippling of the erythrocytes. A 2-yr-old Negro girl (Case 4) had a CSF pressure of 600 mm, protein 83 mg%, and Pb lines at the ends of the long bones. In the 7-yr-old white boy (Case 5), the CSF showed a pressure of 360 mm, 10 lymphocytes and 85 mg% protein. Hb was 8 g. The 6th case (2-1/2-yr-old white boy) showed a Hb of 7.8 mg/100 ml, stippled red cells, a 4+ coproporphyrinuria and Pb lines in the long bones. Therapy with EDTA, iv fluids, ACTH, craniectomy, decompression, etc, proved futile in these cases.

The pathology of the 6 cases, discussed in detail, gave evidence that subclinical cerebral episodes can occur with severe focal damage to the cerebellar cortex to the walls of medium-sized and small vessels, but not necessarily with significant cerebral damage. In the final illness the main damage may be to the walls of vessels in the brain and meninges with accumulation externally of a serum-like exudate and marked dilatation of the perivascular spaces. Slight focal cellular infiltration, chiefly lymphocytic, is sometimes present about the meningeal and cerebral vessels. Although focal swelling of axis cylinders and myelin sheaths is common, there is no pallor of myelin staining or separation of the sheaths such as occurs in the edema around tumors and in that of alkyl Sn poisoning. In occasional cases, the picture is complicated by severe early patchy necrosis of the cortex and even of the deeper structures (Case 4). It is possible that this is brought about by pressure on already damaged arteries and arterioles by the swollen brain producing a vicious circle. When necrosis of groups of nerve cells is very focal, eg, Ammon's horn in Case 3, the convulsions may well play an etiologic role. Pb concentrations determined in all cases were in mg/100 g: 7.6-18 in bone; 0.10-1.06 in brain; 0.88-2.0 in kidney; 0.92-4.3 in liver.

When feeding rats, using a dosage of 40 ppm of triethyl Sn hydroxide in some animals, 80 ppm in others, the authors were able to confirm the occurrence of a striking interstitial edema after 10-14 days at which time paraplegia followed by quadriplegia and death was observed in a number of the animals. Clinical and anatomical recovery followed in those from whom the poison was then removed. In those dying or killed with the fully developed lesions, the volume of the spinal cord appeared to be increased; this was not conspicuous in the brain.

Feeding experiments in dogs were for various reasons not successful, but by repeated iv injections over a period of 4-5 wk in 2 animals, similar but not such marked lesions were produced in the white matter. In the 1st of these, ~1 mg/kg of triethyl Sn acetate was injected every few days for 30 days; in all, 10 injections were given and the dog was killed on the 34th day. A short period of apnea sometimes followed the injection, and stupor, or loss of consciousness, persisted for as long as 1/2-1 hr. EKG showed no significant change. In the 2nd dog, the dosage was ~1 mg/kg, given in 2 injections over a period of 25 days and the animal was killed on the 29th day. The dog was agitated and ataxic for a time after each injection but not unconscious. EKG showed no abnormality.

Because of the absence of macromolecular substances in the interstitial edema of white matter in these animals, it is considered that the edema was a transudate rather than an exudate. There was no evidence that it was associated with damage to the blood-brain barrier. In the rats the edema was sufficiently severe to produce increase in volume of the spinal cord (spinal swelling). Authors did not observe a detectable increase in the volume of the brain in either the rats or the dogs. If the lesions in the dogs had been of comparable severity to those in the rats, an increase in the cerebral volume would have been expected.

In the discussion the authors sum up what is known and unknown about the pathogenesis of these 2 contrasting lesions, ie, exudative edema and cerebral swelling in Pb encephalopathy and transudative edema in triethyl Sn poisoning.

2975 Wachstein, M. (St. Catherine's Hosp., Brooklyn, N.Y.): REPORT ON THE INCREASE OF LEAD POISONING AS REVEALED BY LABORATORY AND X-RAY EXAMINATIONS. I. CLINICAL AND LABORATORY ASPECTS. Proceedings of the Rudolph Virchow Medical Society in the City of New York 19:9-12, 1960.

The presentation of this report has been stimulated by the occurrence of a relatively large number of fatal cases of Pb poisoning in children in the age group 1-3 yr. Seven fatalities occurred in the author's 350 bed hospital. Incidence, causes and diagnosis of Pb poisoning are discussed, and pathologic finding on autopsy are briefly described. Aside from changes seen in the brain, in all cases typical inclusion bodies were found in kidney sections, less frequently in those from the liver. Also, highly abnormal amounts of Pb were found in kidney and liver.

2976 White, H.H., and Fowler, F.D. (Univ. Kansas Med. Center, Kansas City): CHRONIC LEAD ENCEPHALOPATHY. A DIAGNOSTIC CONSIDERATION IN MENTAL RETARDATION. Pediatrics 25:309-15 (Feb.), 1960.

A case of chronic Pb poisoning is reported in which a 3-yr-old girl did not show the usual signs and symptoms of Pb encephalopathy but instead displayed behavior disorders with progressive dementia. Extreme irritability, withdrawal, constant crying, incoherent babbling, etc were observed in the formerly normal child ever since she had fallen from her crib ~1 mo before admission to the hospital. Analyses revealed 0.18 mg Pb/100 ml of blood and urine strongly positive for coproporphyrins; X rays showed Pb deposition beneath the epiphyses of the long bones. The child had frequently been eating chipped paint from the porch, crayons, etc; pica had been observed for ~2 yr. Treatment with CaEDTA brought effective clinical improvement. But it is pointed out that the prognosis in this patient must be guarded until time has permitted an adequate evaluation of intellectual development. (20 references)

2977 Yates, M.Y., and Ramjohn, K. (Gen. Hosp. San Fernando, Trinidad, West Indies): A CASE OF LEAD POISONING. Radiography 26: 175-7 (June), 1960.

A 1-yr-old boy was admitted with drowsiness, twitching in both arms, and stiffness in the neck, and advanced bilateral papilledema. Blood analysis showed moderate anemia with a reticulocyte count of 15% but no basophilic stippling of the red cells. Vomiting had persisted for ~2 mo. X rays of the skull showed widening of the sutures and the ends of the long bones showed an increased density suggestive of Pb poisoning. Since chelates were not available, the boy was treated with Ca gluconate and Mg sulfate im, but he deteriorated rapidly and died the next day. The mother recalled that the child had been biting his painted crib for ~2 mo, and it was assumed that the paint had probably contained Pb and had been the cause of the fatal Pb intoxication.

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2978 American Academy of Pediatrics: REPORT OF SUBCOMMITTEE ON ACCIDENTAL POISONING. STATEMENT ON DIAGNOSIS AND TREATMENT OF LEAD POISONING IN CHILDHOOD. Pediatrics 27:676-80 (Apr.), 1961.

Lead intoxication in children, occurring most frequently between the ages of 1 and 3 yr, is usually caused by eating crumbling, peeling or easily chipped paint. Around 80% of symptomatic cases occur during the summer. The history of pica should be considered in public health surveys, even in cases where the occurrence of pica is denied. With rare exceptions, cases of pediatric Pb poisoning occur in older sections of urban areas where old tenements or other dwellings have been painted over 15-20 yr ago. Pb is still found in exterior house paints, particularly those specified as mildew suppressants. Inhalation of Pb fumes resulting from the burning of wooden battery cases impregnated with Pb salts and swallowing Pb medallions are additional causes of Pb intoxication.

Pb poisoning in children manifests over a period of 3-6 wk by lack of appetite and lassitude, changes in personality too vague to describe clearly, and developmental regression to the point of losing acquired skills, clumsiness, incoordination or ataxia. Anemia may be present, but may be independent of Pb poisoning. Constipation, abdominal colic and brief self-limited convulsive episodes may also occur. Any chronic infection may precipitate the symptoms of Pb poisoning acutely.

If not recognized at this time, the Pb poisoning may continue and rapidly lead to acute encephalopathy with resultant death or permanent damage to the central nervous system. In older children (>2 yr), recurrent, less severe episodes are more likely, suggesting some degenerative cerebral disease. Due to similar seasonal incidence, poliomyelitis and Pb poisoning are sometimes confused. In older children, peripheral neuropathy is a characteristic finding. Both mother and physician may at first be misled into thinking that the child has a severe functional behavior disturbance.

Due to the paucity of positive physical findings in early Pb intoxication, greater reliance must be placed upon clinical history, environmental factors and laboratory findings. Removal of the child from the environment may be necessary before laboratory data are available. Rapid screening procedures include X rays of the long bones and abdomen, hematologic studies for anemia and basophilic stippling of the erythrocytes, and urinalysis for glycosuria, aminoaciduria and coproporphyrinuria. If any of these laboratory tests are positive, the child must be hospitalized and treated immediately. Two successive determinations of Pb in blood and urine should be obtained for definite positive findings. In general, a urinary Pb content of >0.08 mg/24 hr, if obtained on 2 consecutive 24-hr specimens, would indicate excessive Pb in the urine. Two successive determinations of ≥0.06 mg Pb/100 ml of whole blood would indicate a positive finding. In severely ill patients blood Pb concentrations are usually >0.10 mg/100 ml of whole blood.

Increased excretion of Pb during EDTA therapy (1.5 mg or more in the urine on any one of the first 3 days of treatment) is an additional factor tending to confirm the diagnosis of Pb poisoning.

Methods of treatment, such as $CaNa_2EDTA$ parenterally injected (in some cases preceded by saline catharsis), hypothermia, early surgical cerebral decompression, and other measures for the control of convulsions, anemia, dehydration, etc, as well as measures for the prevention of re-exposure, are outlined.

2979 Andrews, B.F. (US Army): CALCIUM DISODIUM EDATHAMIL THERAPY OF LEAD INTOXICATION. THE SIGNIFICANCE OF AMINO-ACIDURIA. Archives of Environmental Health 3:563-7 (Nov.), 1961.

$CaNa_2EDTA$ was used in the treatment of Pb intoxication in 2 children with pica (a 17-mo-old Caucasian female and a 23-mo-old Negro male) and in 1 adult (40-yr-old Negro male) who had drunk "moonshine" distilled in old automobile radiators. In the children, a 24-hr urinary Pb of 0.14 and 0.22 mg, respectively, Pb lines in long bones and stippled erythrocytes, and in the adult, 0.5 mg Pb/l urine, anemia with stippled erythrocytes and abnormal electroencephalogram confirmed the poisoning. Treatment with EDTA was two 5-day courses (iv, 75 mg/kg/day) with an interval of 3 days between treatments, and 60 mg/kg/day, followed after cerebral decompression by 3 additional 5-day courses, respectively, in the children; 4 courses of 2 g/day for 5 days in the case of the adult. In all 3 patients amino-aciduria appeared in the course of EDTA treatment; it disappeared in the children after 2 courses of therapy, but persisted for >2 mo in the adult. This condition is discussed in relation to the findings of proximal renal tubular lesions in experimental animals and humans treated with EDTA. The author suggests that α-amino N determinations before, during and after EDTA treatment may be important in assessing proximal renal tubular function. Should amino-aciduria persist after a 5-day course of therapy, an increased interval of time is suggested prior to another period of therapy.

Discontinuance of EDTA treatment of Pb intoxication is not proposed, but more carefully controlled dosage and intervals of therapy are urged.

2980 Andrews, B.F. (Walter Reed Army Inst. Res., Washington, D.C.): HAZARDS OF EDATHAMIL (EDTA) THERAPY IN LEAD INTOXICATION. Letters to the Editor. Pediatrics 28: 161-2 (July), 1961.

The author thinks that the Report of the Subcommittee on Accidental Pb poisoning in Childhood (Pediatrics 27:676, 1961) should have mentioned the potentially severe toxic effects of iv CaEDTA. Some reports have noted aminoaciduria in Pb poisoning and attributed it to the toxic effect of the metal on the proximal tubules, but did not state whether aminoaciduria was present before CaEDTA therapy. He therefore believes that determination of amino acid excretion before, during, and after administration of CaEDTA should be of help in gauging therapy, its dose and intervals between courses. Lower dosage and shorter periods of therapy should be used in patients with evidence or history of renal disease.

2981 Anonymous: LEAD ENCEPHALOPATHY IN CHILDREN. Annotations. Lancet 2:475 (Aug. 26), 1961.

The occurrence of Pb encephalopathy in children is discussed on the basis of 7 references, and it is pointed out that this condition should always be considered in obscure cases of apparent encephalitis or of raised intracranial pressure in childhood. Although in the UK the disease is considerably less common than in the US, the diagnosis is easily overlooked. The discussion includes treatment procedures, such as urea administration for the reduction of intracranial pressure.

2982 Arena, J.M.: REPORT FROM THE DUKE UNIVERSITY POISON CONTROL CENTER. LEAD POISONING. North Carolina Medical Journal 22:26-8 (Jan.); 73-4 (Feb.); 125-6 (March), 1961.

The report deals primarily with Pb intoxication in children, its causes and the methods for its early detection. The clinical and laboratory criteria for diagnosis are outlined. The use of EDTA in treatment and in diagnosis of Pb intoxication, its routes of administration and dosage are discussed. Also briefly mentioned are poisonings caused by Pb arsenate, Pb arsenite and TEL.

2983 Canestri, G. (Children's Hosp. "Cesare Arrigo", Alexandria, Egypt): Avvelenamento da piombo nel lattante. Un caso dovuto all'uso di paracapezzoli di Pb. (LEAD POISONING IN THE INFANT. A CASE DUE TO USE OF A LEAD NIPPLE SHIELD.) Minerva Pediatrica 13:617-22 (Apr. 21), 1961.

Stating first that Pb poisoning is an important but little known cause of morbidity and mortality in infancy, the author reviews at some length the sources of such poisoning, the signs and symptoms and treatment. Among the sources, 13 cases had been attributed to the use of nipple shields (since 1902). The case reported is that of a 4-mo-old child who 20 days before admission had become restless, stopped gaining weight, regurgitated frequently; these signs became aggravated to the point that at the time of admission she presented generalized tonic convulsions. The infant, nursed by the mother, had developed normally in the 1st 3 mo.

Among the laboratory findings, a qualitative test for Pb in urine was highly positive; porphyrin was 1200 µg/l (mother's urine, 160); radiology of the bones showed typical Pb lines. Subsequent quantitative analysis of Pb in blood gave 75 µg% (mother's blood, 35). The child was treated with iv infusions of glucose, chloride and plasma, vitamins, barbiturates, cortisone, Ca, BAL, antibiotics and transfusions, etc. On the 15th day, Pb in blood was 45 µg%. In closing, the author states that the diagnosis in such cases is difficult because of the intensity and variability of the symptoms. In the discussion the question is raised whether the short time the nipple shield had been used (2-3 wk) was sufficient to cause poisoning and that probably other factors had intervened. The importance for an unequivocal diagnosis, the examination of the blood, X rays of bones, and analyses of Pb in the urine, feces and blood, in addition to clinical examination, are essential.

2984 Christian, J.R. (Poison Control Comm. Chicago Board Health, Ill.): LEAD POISONING IN CHILDREN. Chicago Medicine 63:15-8 (June 24), 1961.

From Jan 1, 1959-Dec 31, 1960, 305 cases of Pb poisoning were reported to the Chicago Board of Health and confirmed by diagnostic tests; among them 1 was <1 yr old, 130 were 1 yr, 110, 2 yr, and the rest, 3-4 yr. All but 17 were due to inhalation of Pb fumes from burning of storage batteries. There were no sex differences, but 273 were non-white. There were 34 deaths, or 1.04% fatality in all poisonings reported in 1959-60; in 1959 Pb constituted 3.8% of all poisonings and accounted for 70.8% of total fatalities; the corresponding values in 1960 were 4.06 and 73%. The highest incidence occurred in June-Sept. So as to alert all physicians to the hazard, the etiology and epidemiology, signs and symptoms, diagnosis, admission procedure, treatment, and schedule of most commonly used drugs, and the urine test for coproporphyrins, are outlined.

2985 Greengard, J., Rowley, W., Elam, H., and Perlstein, M. (Cook County Children's Hosp., Chicago, Ill.): LEAD ENCEPHALOPATHY IN CHILDREN. INTRAVENOUS USE OF UREA IN ITS MANAGEMENT. New England Journal of Medicine 264:1027-30 (May), 1961.

In 1959, 142 cases of Pb poisoning were admitted to Cook County Children's Hospital. Forty-two were diagnosed as having encephalopathy of whom 10 died (23%); in the 120, pica was the cause and in 22, acute poisoning from the burning of battery casings. The ages were from 12 mo-5 yr, with the greatest number in the range 18 mo-3 yr (32). Thirty of the 42 with encephalopathy, received iv treatment with urea. These children were the more severe cases. Urea was administered as a drip of a 4% solution in 5% dextrose in water, at a rate of ≤60 drops/min. A 30% solution was used in a few severe cases. Three of the cases are described. $CaNa_2EDTA$, bilateral wide decompression and symptomatic therapy were also applied as indicated. The authors advise that EDTA should be withheld for 12-24 hr while urea is being administered, and repeated cleansing enemas should be given to remove Pb from the bowel before deleading is attempted. Of the 11 children who had decompressions, ~50% died. In general, these were late, and at least 1 was a hopeless case.

2986 Haritos, N.P. (Children's Hosp., Washington, D.C.): CHRONIC LEAD INTOXICATION: A REPORT OF 24 TREATED CASES AT CHILDREN'S HOSPITAL. Clinical Proceedings of the Children's Hospital (Washington, D.C.) 17: 110-5 (Apr.), 1961.

A review is presented of 24 cases of chronic Pb poisoning in children over the period Jan. 1957-June 1959. A history of pica was obtained in all cases. The findings and results are compared with a previous report on a similar group for the preceding 7 yr (Abstract No. 2952).

The criteria used in defining Pb intoxication differ from the previous report in that 1 or 2 of the following should be fulfilled: ≥0.05 mg Pb/100 ml blood level or a urinary ≥0.08 mg Pb/1 before treatment. Of the 24 patients, 14 were boys and 10 girls, all but one colored, ranging in age from 12 mo->36 mo (1 >36 mo); 50% were in the 19-24 mo age group. Clinically there were 4 groups: asymptomatic 37.5%; symptomatic 20.8%; mild encephalitic 25.0%; severe encephalitic 16.5%. Gastrointestinal complaints (11 cases) along with neurological complaints (9 cases) were the most common, none had gum-lines. Laboratory findings showed that 75% (18) had abnormally low hemoglobin levels, (>10 g/100 ml being considered normal; 86% in the comparison study), and 80% (19) had normal white blood counts (<15000/mm^3). Only 7 patients evidenced basophilic stipplings (3 after repeated smears). Cohen and Ahrens' study had 50% with stippling. Eosinophilia (>5%) was found in 3 patients and 75% (18) had normal urines. The 6 abnormal urines showed proteinuria (2), glycosuria (3), pyuria (4), and hematuria (1). Lumbar punctures performed on 11 patients gave normal values on 6, the 3 abnormal patients being encephalitic and 1 being traumatic. Of electroencephalograms on 5 patients, 3 were abnormal. In X rays of the long bones, 21 children exhibited density of metaphyses.

Treatment consisted of 30 mg EDTA/kg body weight/24 hr, given by hypodermoclysis, every 8 hr for 2 5-day periods with an intervening 3-day "rest" period. The results are presented in a table. Before treatment, 15 of the 24 had blood levels of ≥0.05 mg/100 ml. After treatment only 7 or 21 determinations were toxic, but the blood level was significantly decreased in almost all cases. Urinary Pb levels showed the same decrease. Follow-up examinations gave the following information: 1 death (previous study 3 of 43); pica ceased in 10 out of 19 following 1st course of treatment; residual findings in only 4 (45% in comparison report); only 6 required repeated treatment, with 5 being cleared of both symptoms and pica.

2987 Ingalls, T.H., Tiboni, E.A., and Werrin, M. (Univ. Pennsylvania; Philadelphia Dept. Pub. Health): LEAD POISONING IN PHILADELPHIA, 1955-1960. Archives of Environmental Health 3:575-9 (Nov.), 1961.

Statistical data are presented and analyzed in an attempt to establish the control of Pb poisoning cases in this city in the same way as epidemic infections were handled in the past. In the ~50 cases registered yearly, Pb-containing paint in old dwellings is a major factor, but spot maps and field investigations suggest that other factors like obsolete plumbing and air pollution, as well as ethnic, social and economic patterns may be involved.

The total of 223 cases of Pb poisoning with 41 deaths are distributed in a table according to years and month of onset, and in other tables by sex, and by race and ethnic group, as well as in a bar graph according to age in months; 197 children were <4 yr.

2988 Litter, L. (Hartford, Conn.): LEAD POISONING IN CHILDREN. Connecticut State Medical Journal 25:15-8 (Jan.), 1961.

A case of Pb poisoning is reported, and the newer treatment with CaEDTA is discussed and outlined. The relative importance for diagnosis of a history of pica, gastrointestinal and central nervous system symptoms, stippled cells, anemia, Pb lines, radio opaque flecks in the gut, coproporphyrinuria urinary glycosuria and blood Pb levels are evaluated. It is pointed out that treatment must often proceed after clinical evaluation and the performance of the more rapid laboratory tests and often prior to completion of all specific chemical tests for Pb.

2989 Portigliatti Barbos, M. (Univ. Turin, Italy): L'avvelenamento da piombo nel lattante. (LEAD INTOXICATION IN AN INFANT.) Minerva Medicolegale 81:246-9 (Nov.-Dec.), 1961.

A fatal case of Pb intoxication in an infant, 4 mo old, caused by the mother's use of Pb-containing nipple shields, is described. The child suffered from cyanosis, persistent dermographia, hypertonia, repeated tonic-clonic convulsions and bronchopulmonary complications. Blood tests showed a slight anemia but absence of basophilic erythrocytes. The Pb level in urine was positive (no data given). Radiological examination did not show any bone alteration. The distribution of Pb in the organs was: (mg/100 g of tissue) liver 2.4; kidney 0.8; stomach and intestine 0.015; spleen 0.05; heart and lungs 0.5; femur 4; brain 1.5; hair 12.5. (16 references)

2990 Romano, C. (Univ. Genoa, Italy): Diabete gluco-fosfo-aminico (sindrome di De Toni-Debré-Fanconi) nel quadro dell'intossicazione subacuta da piombo. (GLUCO-PHOSPHOAMINE DIABETES (DE TONI-DEBRE-FANCONI SYNDROME) OF SUBACUTE LEAD POISONING.) Minerva Pediatrica 13:748-57 (May 19), 1961.

A case of subacute Pb intoxication in a 7-mo-old child is reported. Intoxication was due to Pb nipple caps. Clinical and laboratory findings showed hypertensive encephalopathy with convulsion, persistent vomiting, hypochromic microcytic anemia. Saturnism was proved by the increased levels of Pb in the blood (108 µg%) and the urine (58.4 µg/24 hr), coproporphyrinuria (142 µg/24 hr on 1st determination, 78 µg/24 hr on the 2nd), basophilic stippling of red cells, and by X-ray tests which showed the characteristic metaphyseal band of bony condensation. There was an involvement of the proximal tubules, with glucosuria, massive amino-aciduria, hyperphosphaturia, citraturia and rickets which constituted De-Toni-Debré-Fanconi syndrome. Only 2 cases of secondary De-Toni-Debré-Fanconi syndrome in Pb intoxication were reported in the literature. The existence of glucosuria with amino-aciduria, and hyperphosphaturia, without rickets, is less rare in the acute stages of Pb intoxication. The presence of hypercitraturia suggests the identity, or at least similarity of the enzymatic changes in the renal tubules in Pb intoxication and in idiopathic cases of De-Toni-Debré-Fanconi syndrome.

2991 Shrand, H. (St. Mary's Hosp., London, England): TREATMENT OF LEAD POISONING WITH INTRAMUSCULAR EDATHAMIL CALCIUM-DISODIUM. Lancet 1:310-2 (Feb. 11), 1961.

The importance of pica in the history of a child suspected of having Pb poisoning, even if the occurrence of pica is denied by the parent, is emphasized. Thus, treatment of pica and removal of the source of Pb will serve to prevent further Pb hazard. Nibbling at painted cots, believed to be a normal, even necessary, habit in the teething stage by parents, constitutes dangers usually unknown to them. Legislation concerning use of Pb-containing paints in the city of Baltimore and England as a whole is briefly discussed. The latent symptom-free period in toddlers, if nibbling of paint continues, is ~3 mo during which Pb distributes in the soft tissues, especially the brain. Early diagnosis is of utmost importance as continued exposure leads from pallor, irritability, constipation, etc, to refusal to eat, play, stand, to the final stage of Pb encephalopathy with profuse vomiting, convulsions, coma and usually death.

In all cases of pica, the blood Pb level is >50 µg/100 g of blood. The urinary Pb excretion is increased >80 µg/1/24 hr. Since time is of the essence, the authors list more rapid diagnostic aids such as X rays of abdomen for radiopaque material and changes in the long bones, urine tests for blood sugar, coproporphyrin and ALA, and blood tests for basophilic stippled cells.

For the mobilization of Pb, $CaNa_2EDTA$ at a dose of 1 g/30 lb of body weight/day (70 mg/kg) is recommended. Intravenous (iv) infusion of relatively large amounts is dangerous, subcutaneous infusion has similar disadvantages, and oral administration is successful only in mild cases. The home care section of St. Mary's Hospital is therefore using the simpler intramuscular (im) technique (5% EDTA solution with 0.5% procaine) which mobilizes as much Pb as the iv method. Survival and debility rates are given from the literature and 2 typical cases of Pb-poisoned boys thus treated and surviving are discussed, confirming the efficacy and safety of im administration of EDTA. In case 1, patient aged 16 mo with anorexia, pallor, and other signs of Pb intoxication caused by chewing at his cot was treated with Fe therapy; prevention of further Pb ingestion seemed to be beneficial. Blood Pb level was 430 µg/100 g; urinary excretion 130 µg/l; scrapings from the cot contained 6.5-10% Pb. EDTA was given im in a 5% solution in a dose of 35 mg/kg, in 2 doses/day for 5 days at home. Urinary Pb excretion rose to 430 µg/l, blood Pb content 1 mo later was 70 µg/100 g, urinary excretion 24 µg/l. Three months after treatment, the boy was normal, but hemoglobin remained at a level of 8.3 g. In case 2, a 2-yr-old boy with vomiting, anorexia and ataxia was admitted for glycosuria with pica present, leading to the diagnosis of Pb poisoning from playing with Pb toy soldiers. A 5% solution of EDTA injected im to a total of 75 mg/kg/24 hr divided into 4 equal doses, for 5 days, brought about complete recovery. One month later, blood Pb was 35 µg/100 g. Three months later, he appeared completely normal (Hb 10.5 g) but basophilic stippled cells were still present. Pica ceased in both children, but the effect of Fe therapy remains uncertain.

2992 Shrand, H. (Evelina Children's Hosp. of Guy's Hosp., London, England): CHRONIC LEAD-POISONING IN CHILDREN. Nursing Times 57:1026-7 (Aug. 11), 1961.

The pathology, symptoms, diagnosis, treatment, and prognosis of chronic Pb intoxication in children are discussed.

2993 Smith, H.J.: PEDIATRIC PLUMBISM PROBLEM PERSISTS. Cincinnati Journal of Medicine 42:409-10 (Oct.), 1961.

The review of 244 Pb poisoning cases recorded among children of the Greater Cincinnati area during the past decade includes sources of Pb exposure, problems involved in the diagnosis of Pb poisoning and its treatment, etc. The legal and social functions of the Cincinnati Health Department in the prevention of Pb poisoning among children are discussed.

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2994 Altshuller, L.F., Halak, D.B., Landing, B.H., and Kehoe, R.A. (Univ. Cincinnati, O.): DECIDUOUS TEETH AS AN INDEX OF BODY BURDEN OF LEAD. Journal of Pediatrics 60:224-9 (Feb.), 1962.

The mean Pb content (mg/100 g) of 82 deciduous teeth removed from "normal" children, 2-1/2-12 yr old, 18 from 6 children dying of acute Pb encephalopathy, and 13 teeth shed normally by 9 children who had survived Pb poisoning, was found to be 1.51, 15.9 and 11.66, respectively. Dithizone and spectrographic methods were used, the accuracy of which was within ±5%. The Pb content of control deciduous teeth was found to rise linearly with time after eruption. Both patients dying from, and surviving Pb intoxication had been treated with versenate or other therapeutic agents.

Further study is necessary to evaluate the reliability of Pb levels of teeth as an index of the body burden of Pb.

2995 Amato, M., and De Bellis, U. (Div. Pediatrics A. Cardarelli Hosp., Naples, Italy): Documentazione radiologica della intossicazione da piombo nel lattante. (RADIOLOGICAL DOCUMENTATION OF LEAD POISONING IN AN INFANT.) Minerva Medica 53:1268-9 (Apr.), 1962.

A case of Pb intoxication in an infant 7 mo old, caused by the mother's use of Pb-containing nipple shields is presented. Diagnosis was documented by X-ray observations showing metaphyseal bands of increased density.

2996 Ammaniti, L., and Longobardi, G. (Hosp. Riuniti, Rome, Italy): Saturnismo cronico da paracapezzoli di piombo in una bambina di 5 mesi. (CHRONIC LEAD POISONING CAUSED BY LEAD NIPPLE PROTECTORS IN A 5-MONTH OLD CHILD.) Archivio Italiano di Pediatria e Puericoltura 22:241-50 (Nov.), 1962.

Intoxications in breast-fed infants due to Pb nipple protectors were unknown in Italy until 1959; since then, 9 cases have been described in the literature. The authors report the case of a 5-mo-old female infant and also mention another recent case in one 2-mo-old. The child had developed normally till the age of 3 mo when, without apparent reason, symptoms of anorexia and anemia, vomiting and nervous disturbances appeared and the child failed to gain further weight. Upon questioning, the mother stated that she had used Pb nipple protectors. X-ray tests showed bone changes characteristic for chronic Pb poisoning, and blood tests revealed the presence of basophilic stippling. The Pb content (μg/1000) in blood, urine and spinal fluid was 571, 75 and 181, respectively (normal values, 200, 50 and 140-380, respectively). A diagnostic test with $CaNa_2EDTA$ (300 mg/50 kg body weight, iv), after 10 hr, reduced the Pb concentration in the blood from 500-135 μg/1000 and increased that in the urine from 100-216 μg/1000. Urinary coproporphyrins were 0.242 mg/l (normal, 100 μg/100 ml). The pressure of the spinal fluid was slightly increased. The infant recovered completely after removal from further exposure to Pb and 5 blood transfusions.

2997 Benson, P.F. (Johns Hopkins Hosp., Baltimore, Md.): INFLUENCE OF CLIMATIC FACTORS ON BLOOD LEAD LEVELS IN CHILDREN WITH PICA. Guy's Hospital Reports 111:306-12, 1962.

The Pb level in blood was determined in 116 children, age 1-37 mo and over, who came from the slum areas of Baltimore and had been seen to ingest paint from window frames and doors. Forty-three (37%) of these children had Pb concentrations above the upper limit of normal (0.06 mg/100 g). Raised Pb levels in the blood were found in a higher proportion of children during July to September than during the rest of the year. A relation was noted between the rise in the mean blood levels in the summer and the rise in the monthly hours of sunshine and the mean daily minimum and maximum temperatures. (From author's summary; 15 references)

2998 Chisolm, J.J., Jr. (Johns Hopkins School Med., Baltimore, Md.): AMINOACIDURIA AS A MANIFESTATION OF RENAL TUBULAR INJURY IN LEAD INTOXICATION AND A COMPARISON WITH PATTERNS OF AMINOACIDURIA SEEN IN OTHER DISEASES. Journal of Pediatrics 60:1-17 (Jan.), 1962.

Twenty-three children with acute Pb intoxication were studied to ascertain the type, pattern, frequency and severity of hyperaminoaciduria. Results were compared with patterns found in 56 patients suffering from a variety of diseases which impair renal tubular functions. Amino acids in the urine were determined by chromatography. Hyperaminoaciduria was classified as slight if 3-6 amino acids were found in excess amounts, moderate at 7-10 amino acids and marked if >10 were found in excessive amounts. Ten of the children studied showed marked, 5 moderate, 5 slight hyperaminoaciduria while 3 showed no increase of amino acids in the urine. The triad of hypophosphatemia, aminoaciduria and glycosuria, known as the Fanconi syndrome, was found in 9 of the 23 children. In all cases these abnormalities disappeared within 2 mo.

It is suggested that in acute Pb poisoning some renal tubular mechanism common and essential for reabsorption of all amino acids is impaired. The pattern of aminoaciduria resembles that found in vitamin D deficiency rickets, cystinosis, Fanconi syndrome of unknown pathogenesis, hyperparathyroidism with renal calcinosis, and congenital renal tubular acidosis. The occurrence of fructosuria and citraturia in Pb poisoning sets this disease apart from other diseases giving rise to the Fanconi syndrome, and may suggest that fructosuria and citraturia result from cellular injury caused by Pb in still other areas. (35 references)

2999 Donahue, L.A., and Brennan, G.G. (St. Vincent's Hosp., New York, N.Y.): LYOPHILIZED UREA IN TRAVERTS SOLUTION FOR THE TREATMENT OF LEAD ENCEPHALOPATHY. Journal of the Medical Society of New Jersey 59:456-9 (Aug.), 1962.

A case of acute Pb encephalopathy in a 6-yr-old boy is presented. Levels of Pb in blood and urine were (μg): 280 and 780, respectively; coproporphyrins in urine, 78 μg CaEDTA at 0.5 g was administered twice daily for 7 days. On 2 occasions during treatment the patient showed signs of intracranial hypertension. In both instances 100 ml of 30% lyophilized urea, which was given at a rate of 30 drops/min, produced satisfactory clinical signs of decompression promptly and without untoward effects.

Lyophilized urea therefore seems to be a potential useful adjunct in the management of Pb encephalopathy. A dose of 1-1.5 g/kg as a 30% solution, administered at the rate of 60 drops/min, is recommended. No harmful effects have been noted following its administration in >50 patients, other than a mild phlebitis at the point of the injection. Since normal blood urea levels range from 20-30 mg/100 cm^3 and toxic levels may be reached, the use of lyophilized urea is not recommended in cases of renal damage.

3000 Garofalo, E., and Mastella, G. (Children's Hosp., Verona, Italy): Il saturnismo cronico nel lattante. Due casi dovuti all'uso di paracapezzoli di piombo. (CHRONIC SATURNISM IN INFANTS. TWO CASES CAUSED BY THE USE OF LEAD NIPPLE SHIELDS.) Minerva Pediatrica 14:1297-1310 (Nov.), 1962.

Two cases of chronic Pb poisoning in infants of 2.5 and 8 mo, respectively, due to the use of Pb nipple shields by the mothers, are reported. In the 1st case, a serious encephalopathy set in after a period of dyspepsia and failure to gain weight. In the 2nd infant, intercurrent purulent meningitis aggravated the anemic syndrome. Both infants showed an increase in the urinary excretion of phosphorus without glycosuria. After iv treatment with EDTA in doses of >100 mg/kg/day most symptoms regressed. The importance of a careful investigation of the history of breast-fed infants in order to prevent and discover Pb poisoning, is stressed.

3001 Greengard, J., Voris, D.C., and Hayden, R. (Cook Co. Children's Hosp.; Univ. Illinois Coll. Med., Chicago): THE SURGICAL THERAPY OF ACUTE LEAD ENCEPHALOPATHY. Journal of the American Medical Association 180: 660-4 (May), 1962.

In 25 severe cases in children, 15-36 mo old, out of 101 cases of acute Pb encephalopathy, observed in the authors' hospital during 1959-61, the medical treatment with urea and $CaNa_2EDTA$ was supplemented with bilateral flap craniectomy Most of the children prior to the operation had been in coma, respiratory arrest occurred in 8, and all but 2 entered the hospital with convulsions. Mortality in these 25 cases was 64% as compared to 31.6% in the total group of 101 children. A 2-yr-old, apparently moribund child, who suffered from generalized convulsions and coma, resulting from ingestion of Pb-containing paint, recovered after a craniectomy supplemented by EDTA treatment. No conclusions were drawn as to the place of surgery in the management of Pb encephalopathy.

3002 Ho, R.K.B. (Poison Control Center, Hawaii): HAWAII BRIEF REPORTS ON POISONING. Hawaii Medical Journal 21:427 (May-June), 1962.

The Hawaii Poison Control Center has recorded only 3 cases in the past 5 yr. Two cases of Pb poisoning are described, 1 in a 3-yr-old girl, admitted to the hospital in December 1961 because of recurrent vomiting of ~5-day duration. The diagnosis was made on the basis of history of ingestion of paint chippings, laboratory, clinical, and X-ray tests. Treatment was with $CaNa_2EDTA$. The other case, a 21-yr-old man, employed in a Pb foundry and handling battery casings, was admitted to the hospital in October 1959 with abdominal pain and vomiting. Removal from further exposure to Pb and supportive measures brought him to prompt recovery.

The principal signs and symptoms of Pb poisoning are summarized and treatment is outlined.

3003 Jacobziner, H., and Raybin, H.W. (Dept. Health, New York, N.Y.): THE EPIDEMIOLOGY OF LEAD POISONING IN CHILDREN. Archives of Pediatrics 79:72-6 (Feb.), 1962.

The etiology, diagnosis and treatment of Pb intoxication in New York City in children <2-6 yr and over, in the months of Jan-Oct in 1961 was compared to that in the same period in 1960. As tabulated for white, non-white and Puerto Ricans, the number of cases for those years were, respectively: <2 yr, 54 and 32; 2 yr, 61 and 58; 3 yr, 22 and 21; 4 yr, 9 and 5; 5 yr, 4 and 5; 6 yr and over, 3 and 2. The totals of 153 and 123 did not include 83 possible Pb poisoning cases reported in 1961 and 20 such cases in 1960. There were 6 fatalities in 1961 and 13 in 1960, all in non-white and Puerto Ricans. The Pb poisoning study group decided to do urinary coproporphyrin screening tests on all children under 6 yr of age in the "Pb belt," ie, the area with the highest incidence of Pb poisoning, and to subject to Pb determination in the blood all those who reacted positively. All children showing a Pb level in the blood of 0.06 mg/100 g and over are referred for further investigation and treatment.

3004 Jacobziner, H., and Raybin, H.W. (Poison Control Center, New York, N.Y.): LEAD POISONING ASSOCIATED WITH ASCARIASIS. New York State Journal of Medicine 62: 2551-3 (Aug.), 1962.

Among the cases reported, a case of Pb intoxication in a 2-yr-old girl, caused by ingestion of painted plaster, was complicated by ascariasis. The patient suffered from abdominal pain, underweight, and anemia. Laboratory findings showed Pb levels of 0.07 mg/100 ml in blood and 0.06 mg/l in urine; Hb, 9.4 g/100 ml; 3.3 million red blood cells.

3005 Kramer, H., and Schmöger, R. (City Children's Clinic, Saarbrücken, Germany): Bleivergiftung im Kindesalter. (LEAD POISONING IN CHILDREN.) Archiv für Kinderheilkunde 166, No. 3:271-8, 1962.

A boy, 5 yr old, an illegitimate child, had been admitted to the hospital with constipation, an enlarged liver and hemolytic anemia. After improvement by appropriate treatment he was discharged but 33 days later had to be readmitted in very bad condition. He was vomiting and having abdominal colic. Basophil stippling was found in his blood smears and X-ray films of the wrist revealed heavy Pb lines. In spite of treatment he died a few days later. His blood contained 0.92 mg Pb/100 ml; the Pb content of his liver, kidneys and bones was 20, 40 and 8 times, respectively, of the normal value, the Pb concentration of urine and feces was tremendous (1.82 mg/350 ml, and 0.23 mg/g), the fluid in the ileum contained 16.6 mg Pb. (The dithizone method was used.) Apparently the child had been given a Pb-containing substance with criminal intent.

A review of the incidence, sources, signs and symptoms and treatment with BAL and EDTA as reported in the literature precedes the presentation of the above case. (28 references)

3006 Muzzetto, M. (Univ. Rome, Italy): Paracapezzoli di piombo e saturnismo cronico in lattanti. (LEAD NIPPLE PROTECTORS AND CHRONIC LEAD POISONING IN INFANTS.) Nuovi Annali d'Igiene e Microbiologia 13:130-9 (Mar.-Apr.), 1962.

Apparently the use of nipple shields as a cause of Pb poisoning in infants is unknown in Italy and other Latin countries.

Some recent reports of this are reviewed. When a Pb nipple protector was partly immersed in 20 ml of milk at 37°C for 48 hr, the milk was found to contain 0.74 mg Pb. It has been stated but not proved that the mother's milk contained Pb for >1 wk after she had discontinued the use of Pb shields. Infants up to 3 yr show gingival hemorrhages but not the Pb line typical for adults in Pb poisonings; absent are also neuritis and polyradiculitis. But these infants show alterations of the fundus of the eye which are rarely observed in older children. The 1st manifestations in infants are irritability and disturbances of the gastrointestinal system such as vomiting. A hypochromic anemia with stippled basophils and nervous convulsions follow, and there is an increase of Pb in the blood, urine and feces. The present treatment consists of oral or iv administration of EDTA.

The author recommends that nipple shields be included in the health laws forbidding the sale of articles containing Pb, for pediatric use, and that the provincial health departments conduct an educational campaign concerning the dangers to the infants by the use of Pb-containing nipple protectors.

3007 Oka, S., Sato, H., Kimura, N., and Sagawa, F. (Showa Med. School, Japan): (ON A CASE OF RECENTLY EXPERIENCED LEAD POISONING.) Journal of the Showa Medical Association 22:227-35, 1962.

Pb poisoning of a breast-fed 1-mo-old male infant is reported. The family used Pb acetate for water proofing purposes. The infant developed severe anemia, porphyrinuria, epiphysial Pb line and stippled basophils in the blood. Six cases of Pb poisoning in infants in Japan, which occurred during the last 15 yr, are reviewed. The possibility of Pb poisoning in cases of infantile anemia of unknown etiology is pointed out. (From authors' English summary; 22 references)

3008 Pease, C.N., and Newton, G.G. (Children's Memorial Hosp., Chicago, Ill.): METAPHYSEAL DYSPLASIA DUE TO LEAD POISONING IN CHILDREN. Radiology 79:233-40 (Aug.), 1962.

Roentgenologic studies were conducted in 48 children treated for Pb poisoning. Among the 48 children there were 10 pairs of siblings including twin brothers. Metaphyseal dysplasias of various degrees were found in 24 children. While metaphyseal dysplasia had long been regarded as of familial origin, the transverse lines of increased density occurring in the long bones in such cases, as described in the literature, were identical with those observed in Pb intoxication and were believed to be due to the latter condition. Representative cases are illustrated. In none of the series described here were similar dysplastic changes seen in the parents and other relatives who had X-ray examination. (From authors' summary)

3009 Preuss, O.P. (Dept. Ind. Med., Euclid Clinic Found., Cleveland, O.): CHILDHOOD PLUMBISM. DOCTOR, WOULD YOU THINK OF LEAD POISONING? Ohio State Medical Journal 58: 665-7 (June), 1962.

A discussion of the essentials of etiology, incidence, diagnosis, treatment and prevention of Pb intoxication in children is presented.

3010 Romano, C. (Univ. Genoa, Italy): GLUCO-PHOSPHO-AMINE DIABETES (DE TONI-DEBRÉ-FANCONI SYNDROME) ASSOCIATED WITH SUBACUTE LEAD POISONING. Panminerva Medica 4:167-75 (Apr.), 1962.

See Abstract No. 2990.

3011 Smirnov, D.D. (Assistant, USSR): Vyyavlenie s pomoshchyu rentgenografii nositel'stva svintsa u detei, prozhivayushchikh v okrestnostyakh zavoda, pererabatyvayushchego svinets. (X-RAY DETECTION OF A LEAD-CARRIER STATE AMONG CHILDREN LIVING IN THE VICINITY OF A LEAD PROCESSING PLANT.) Gigiena i Sanitariya 27:8-11 (Oct.), 1962.

X-ray examinations of 511 children from nurseries and kindergartens, situated in the vicinity of a Pb-processing plant, revealed 64 cases with infiltration bands in the zones of preliminary calcification of thigh, shin, forearm, and hand bones. Differential diagnosis showed the infiltration bands to be due to Pb deposits in bone tissue. Analysis of urine from 31 children revealed that Pb was contained in the urine of 21 (0.01-0.028 mg/l in 14 and >0.04 mg/l in 7) and traces of it were found in 6. In the control group of 21 children, only 1 child showed traces of Pb in urine. The Pb-carrier state was caused by industrial discharges containing Pb.

Spectrographic analyses of 60 samples of soil and of 15 samples of cabbage grown on the same soil showed concentrations of Pb in the ash of 0.56-0.81% and 0.152-0.4%, respectively. Consequently, X-ray examinations of certain parts of the skeleton may be recommended for the purpose of early detection of a Pb-carrier state in children who are living in, or frequenting, institutions for children situated in districts located near Pb processing plants.

3012 Whitaker, J.A. (Dallas, Texas): LEAD POISONING - A MASQUERADE. Southern Medical Journal 55:1184-6 (Nov.), 1962.

The author emphasizes the seriousness and frequency of Pb poisoning in children and the difficulty of diagnosis. In the period 1944-1957, 4 cases were hospitalized in the Children's Medical Center. In the 3 yr from 1958 when interest had been aroused, 19 cases were diagnosed. The author compares the symptoms and laboratory findings in 11 of these cases which were suspected, and in 8 with classical symptoms. Since no data were available on the amount of Pb excreted by normal children after EDTA administration, this diagnostic test was applied, using a dose of 75 mg/kg im to (1) 24 normal children, (2) the 8 with classical symptoms and (3) the 11 suspected cases. In Group 1, pre-EDTA urinary Pb values ranged from 0-160 μg/l (av 15 μg/l), and post-EDTA 4-405 μg/l (av 165 μg/l); in Group 2, the corresponding values were 0-500 μg/l (av 146 μg/l) and 971-3030 μg/l (av 1966 μg/l). In group 2 there were 2 children who had received previous EDTA treatment; although their pre-EDTA values were within the normal range, their post-EDTA values were extremely elevated. In group 3 pre-EDTA Pb excretion was 0-35 μg/l, thus below the accepted abnormal values (1 of them showed 120 μg, but showed no classical symptoms); post-EDTA, 608-1570 μg/l (av 995 μg/l). A urinary Pb excretion of >500 μg/l was considered as indicative of excessive ingestion of Pb-containing substances.

3013 Whitaker, J.A., Austin, W., and Nelson, J.D. (Univ. Texas S.W. Med. School, Children's Med. Center, and Parkland Hospital, Dallas, Texas): EDATHAMIL CALCIUM DISODIUM (VERSENATE) DIAGNOSTIC TEST FOR LEAD POISONING. Pediatrics 29:384-8 (Mar.), 1962.

Twenty-four normal children, average age 28 mo, 11 children, average age 25 mo, with suspected Pb intoxication, and 8 children, average age 24 mo, with classic signs and symptoms of Pb intoxication, were injected im with 75 mg/kg of $CaNa_2EDTA$ in a 20% solution, divided in 3 doses at 8-hr intervals. Average urinary Pb levels in the 3 groups before administration of the drug were 15, 24, and 146 µg/l, respectively, compared to 165, 995 and 1966 µg/l, respectively, after EDTA administration. The authors conclude that the EDTA test provides clear-cut differentiation between normal individuals and those with increased exposure to Pb. Urinary excretion of Pb of >500 µg/l is an indication that there has been excessive ingestion of Pb-containing substances. (13 references)

1963

3014 Anonymous: PAINTING TO REDUCE LEAD POISONING. American Journal of Public Health 53:2043 (Dec.), 1963.

A "Paint-up Campaign" has been initiated by the Health Department and the Downtown Area Renewal Effort's Safety and Sanitation Committee in the Red-Hook-Gowanus Section of Brooklyn, N.Y. Eight blocks were selected as a pilot study. Volunteers visited families with children living there and interested them in having their apartments painted free of charge. Other tenants were offered free paint to do their own apartments. So far, 19 families have repainted their homes with Pb-free paint. The project may be expanded to other parts of Brooklyn.

3015 Astolfi, E. (Secretary, Soc. of Legal Med. and Toxicol., Buenos Aires, Argentina): Saturnismo en la infancia. (SATURNISM IN INFANCY.) Semana Medica (Buenos Aires) 123:2026-31 (Dec. 19), 1963.

For the diagnosis of Pb poisoning in children the following 4 criteria must be considered: (1) the presence of the source of the poison, (2) clinical findings, (3) indications of Pb absorption and (4) laboratory findings. In referring to the case of a seriously poisoned infant, the author points out that deduction rather than induction is helpful to detect the source of the poisoning. When the mother talks about a small battery repair shop being operated within their dwelling place, the physician may suspect Pb poisoning. Ash from chimneys of factories (as in a recent case of an endemic area), paints, toys may contain Pb. Tap water, especially that drawn from new pipes, may dissolve Pb from these pipes; the practice of connecting electric cables to water pipes facilitates such ionization. Carbonated water siphons, wrappers for chocolate and other candies often contain Pb. Clinical findings include neurologic, gastrointestinal, hematologic and urinary anomalies. Pb absorption in children is detected by X rays of the long bones showing radiopaque densities and by the presence of >10 µg% of urinary coproporphyrin. Laboratory findings include the determination of Pb in blood and urine. A content of up to 0.6 mg Pb/100 g blood is normal while 0.06-0.08 mg% indicate an increased absorption. The threshold limit for urine is 0.08 mg/24 hr. Signs and symptoms of Pb poisoning and treatment with EDTA are discussed.

3016 Bautista, Z.P. (Harper Hosp., Detroit, Mich.): LEAD POISONING. A REVIEW AND REPORT OF SEVEN CASES. Harper Hospital Bulletin 21:43-55 (Mar.-Apr.), 1963.

The literature on Pb poisoning is reviewed on the basis of 53 references and results of a study on 7 children, 1-3 yr old, are reported. All 7 had histories of pica and their poisoning occurred during the summer months. The urinary level of Pb was above the normal of 0.05 mg/100 ml/day in all 7; 3 showed changes of the central nervous system. X-ray studies showed radiopaque densities in the gastrointestinal tract and an increase in metaphyseal densities in 5. Basophilic stippling was found in only 2 children, 3 showed microcytic and and hypochromic red blood cells. Three had elevated protein. EDTA was administered orally or iv at daily doses of 65 mg/kg for 5 days or in 2 or 3 courses of 5 days each. A 5-day regimen of 75 mg/kg/day of EDTA in 100-200 ml of 5% dextrose in water, administered in 2 equal doses at a 12-hr interval, is recommended.

3017 Calle R.J., and Restrepo, A.C. (Univ. Antioquia, Colombia): Saturnismo o intoxicacion plumbica. Comentarios y presentacion de cinco casos. (SATURNISM OR LEAD POISONING. COMMENTS AND PRESENTATION OF FIVE CASES.) Antioquia Medica 14:326-53 (June), 1963.

The frequency and distribution of Pb poisoning in various countries is discussed. There is no special legislation as yet in Colombia but the industrial physicians are striving to eliminate Pb hazards in industry. Etiology, physiopathology, anatomic pathology, signs and symptoms of acute and chronic Pb poisoning, diagnosis and treatment are discussed and 6 cases of Pb intoxication in the same family, due to inhalation of Pb oxide, are reported. The family lived in a Pb foundry all together in a single room close to the workshop. Both the 52-yr-old father and the 36-yr-old mother suffered from abdominal colics and vomiting. They had 13 children of whom 9 had died at an early age. Surviving were 3 girls, aged 3, 12 and 17 yr and a boy of 6 yr. All had digestive symptoms; with exception of the son, all had cardiovascular symptoms, and all but the father signs of disturbance of the central nervous system. Encephalitis had been diagnosed in the 3-yr-old girl. Hb was decreased in all cases and the number of stippled erythrocytes was elevated in all except the youngest girl.

It is pointed out that physicians should be aware of the fact that Pb poisoning occurs not only in adults working with Pb, but also in children who ingest Pb paints from toys and walls, and other sources.

3018 Canepa, G., and Pelizza, A. (Inst. Giannina Gaslini, Genoa, Italy): Linee da piombo nei saturnismo infantile. (LEAD LINES IN INFANTILE SATURNISM.) Minerva Ortopedica

14:459-61 (Aug.), 1963.

A case of subacute Pb poisoning in a 3-yr-old child is reported. One month before the diagnosis was made, the child developed irritability, pallor, anorexia, and lost weight. The condition became aggravated by vomiting, fever, lipothymia and encephalitis. Blood tests showed the presence of 3 granulated basophils/1000 red cells. Pb poisoning was suspected since the child was the son of a varnisher and had been seen to ingest Pb-containing enamel, such as red and white Pb. A roentgenogram of the skeleton showed radiopaque bands of the long bones, particularly of the forearm, leg and knee. Treatment with EDTA (200 mg daily for 2 wk) resulted in recovery within 20 days. The differences in the symptomatology of Pb poisoning in infants and children versus that in adults are discussed. The manifestations in the former begin with loss of weight, pallor, irritability, anorexia, dyspepsia, followed by abdominal colics, vomiting and afflictions of the central nervous system, while in the adult mainly the peripheral nervous system is involved. There is a hypochromic anemia, basophil granulations in the red cells, increased free protoporphyrin in the blood and coproporphyrin in the urine; albuminuria and cylindruria are less evident in children than in adults; glycosuria occurs only in rare cases. The gingival line which is common in the adult and rather frequent in 2-3 yr old children, has not been observed in the newborn and infant which, however, show gingival bleeding. Polyradiculitis and neuritis are absent in the 1-yr old, but occur in older babies. The Pb contents of blood and urine are elevated throughout the whole period of intoxication and for several months thereafter. The bone lesions caused by Pb are visible only radiologically and do not produce clinical manifestations. The diagnosis of Pb poisoning in the infant is difficult, particularly in the absence of precise anamnestic data, and the syndrome is similar to that of many infantile diseases. The most reliable indication is the presence of condensed metaphysial bands seen upon X ray of bones. Treatment consists in administration of EDTA. Mild cases recover completely, graver ones may lead to psychic disturbances, chronic nephritis or death.

3019 Christiaens, L., and Fontaine, G. (Fraternity Hosp., Roubaix, France): L'intoxication saturnine chez l'enfant (à propos d'une "affaire du collier"). (LEAD INTOXICATION IN CHILDREN. THE CASE OF THE NECKLACE.) Pédiatrie 18, No. 2:143-70, 1963.

Pb intoxication in children is much less frequent in Latin countries than it is in the Anglo-Saxon countries. Therefore, the authors wished to draw the attention of French pediatricians to the hazard of Pb poisoning in young children and to point out that in cases of gastric or hepatic trouble, tests for the presence of basophil stippling of the red blood cells and urinary coproporphyrins are indicated.

The case of a 22-mo-old girl who broke a necklace belonging to her mother and swallowed 13 of the pearls made of a plastic material and coated with a shiny paint is reported. The following day, the child developed severe abdominal pain and vomiting; during the night, diarrhea set in and the child passed 5 of the pearls which, however, had lost their brilliancy. Analysis revealed that the coating of the pearls contained 18.6% Pb. Incubation for 5 days of 2 macerated pearls at body temperature raised the Pb content of gastric juice from 14 µg/100 ml to 1.789 mg/100 ml. Hematologic studies in the child showed the absence of anemia but the presence of basophilic stippling. The blood contained 5 µg/100 ml, the urine 80 µg/l.

Intravenous administration of 0.5 g CaNa$_2$ gluconate or Ca diaminetetraacetate did not increase the urinary Pb excretion but urinary coproporphyrins rose from practically 0-2000 µg/l. The child recovered rapidly after daily oral treatment with 1 g CaNa$_2$ gluconate for 5 days. A bibliography of 96 references on childhood poisoning by Pb is included. Signs and symptoms, clinical and laboratory findings, metabolism and treatment of Pb poisoning in children are reviewed. (96 references)

3020 Cohen-Solal, J. (France): Quelques intoxications importantes ou peu connues. (SEVERAL IMPORTANT OR LITTLE-KNOWN TYPES OF POISONING.) Médecine Infantile 70: 471-80 (Oct.), 1963.

Childhood poisoning by insecticides, Pb and boric acid is discussed. As stated by the author, Pb poisoning in infants is not well known in France and seems to be rare; the thought is expressed that this may be due to the fact that it is not always recognized. A recently reported case (Abstract No. 3019) is described. The clinical picture and treatment, based principally on Chisolm's observations, are reviewed.

3021 Farber, E.E. (Baltimore Health Dept., Md.): LEAD PAINT POISONING STILL WITH US. Maryland State Medical Journal 12:296 (July), 1963.

In 1962, 44 children, 1 of whom died, were Pb paint victims in Baltimore, and 3 cases have been already reported in 1963. Symptoms indicative of Pb poisoning are listed. As these are general for many child ailments, Pb poisoning must not be excluded, especially in pica cases.

The following categories for cases of Pb paint poisoning in children are listed: (1) increased Pb absorption (blood Pb >0.05 mg/100 g. positive bone X ray); (2) Pb poisoning without encephalopathy (in addition to 1, at least 2 of: anemia, increased coproporphyrinuria, irritability, constipation, vomiting); (3) Pb encephalopathy (in addition, persistent vomiting, ataxia, convulsions, somnolence, semistupor, or coma).

3022 Ford, D. (United Hospitals of Newark, N.J.): LEAD POISONING STILL A HAZARD; HEALTH OFFICER HAS ROLE IN CONTROL. Public Health News (N. Jersey State Dept. of Health) 44:194-6 (Aug.), 1963.

Attention is called to the fallacy of belief that chronic Pb poisoning is a thing of the past and to the need of recognizing this disease in childhood. In Newark 44 cases were seen in the Babies' Hospital since 1954, 16 of them in the past 2 yr; this reflects more accurate diagnosis rather than increased incidence. The epidemiology, diagnosis, laboratory tests and treatment are briefly stated. Control of Pb poisoning in children involves the concerted efforts of the patents, the physician, public health authorities and social agencies responsible for improvement of housing. It is also pointed out that there is no legislation in the State of New Jersey controlling the labelling of Pb-containing products.

3023 Gutelius, M.F. (George Washington Univ., Washington, D.C.): THE ERADICATION OF LEAD POISONING. Clinical Proceedings of the Children's Hospital (Washington) 19: 169-70 (June), 1963.

Programs developed in Baltimore and Cleveland for the control of Pb poisoning of children are discussed. Recommended steps to wipe out Pb poisoning in Washington are the following: "1. Lead poisoning should be made a reportable disease. 2. A campaign, under the direction of the District Health Department and the Medical Society, should be undertaken to instruct physicians and nurses in methods of case finding, in early diagnoses and treatment; and to educate parents concerning the dangers and prevention of lead poisoning. 3. Low cost housing units in good repair should be made available for Negro families, especially the large families. This is the basic approach for eradicating plumbism."

3024 Jacobziner, H., and Raybin, H.W. (City of New York Dept. of Health): ACCIDENTAL CHEMICAL POISONINGS. LEAD POISONING WITH TWO FATALITIES. New York State Journal of Medicine 63:2269-70 (Aug. 1), 1963.

Two incidents were reported recently to the New York City Poison Control Center. A 3-1/2-yr-old boy, suffering from vomiting spells but without a history of pica, was treated for a cold in 3 different hospitals. When the child became comatose and had abdominal pains, he was taken to a 4th hospital where a tentative diagnosis of Pb poisoning with encephalopathy was made. The child died 2 days after admission. Autopsy confirmed the diagnosis of Pb poisoning. There had been broken painted plaster in the premises where the child had lived for the past 3 yr but the boy had not been seen eating plaster. The 2nd incident concerned a 2-1/2-yr-old boy who had vomited several days prior to admission to the hospital where he died of Pb poisoning after 9 days, in spite of appropriate therapy.

3025 Jacobziner, H., and Raybin, H.W. (City of New York Dept. of Health): ACCIDENTAL CHEMICAL POISONINGS. LEAD POISONING AND GLUE SNIFFING INTOXICATIONS. New York State Journal of Medicine 63:2846-8 (Oct. 1), 1963.

Four incidents were reported one of which was due to Pb poisoning. A 3-1/2-yr-old girl with a history of ingestion of painted plaster died of Pb encephalopathy 19 hr after admission to the hospital, in spite of treatment with versenate. The blood Pb level was 0.46 mg/100 ml; a urine test showed a trace of coproporphyrin.

3026 Jacobziner, H., and Raybin, H.W. (City of New York Dept. of Health): ACCIDENTAL CHEMICAL POISONINGS. LEAD POISONING. New York State Journal of Medicine 63:2999-3001 (Oct. 15), 1963.

Eight recent cases of Pb poisoning in children, aged 2-4.5 yr, are described. There was a history of plaster ingestion in each incident. All 8 children exhibited increased Pb levels in the blood; some showed anemia, abdominal pains or vomiting, one developed convulsive seizures and went into coma. After treatment with Ca versenate, often in combination with Fe, the children became symptom-free and could be discharged from the hospital. The author states that up to July 12, 1963, 119 cases of Pb poisoning, 2 of them fatal, had been reported to the Poison Control Center in 1963, compared with 82 cases with 2 deaths in the same period in 1962.

3027 Jacobziner, H., and Raybin, H.W. (City of New York Dept. of Health): ACCIDENTAL CHEMICAL POISONINGS. CAMPHORATED OIL, TALCUM AND LEAD POISONINGS. New York State Journal of Medicine 63:3575-7 (Dec. 15), 1963.

The case of a 4-yr-old boy with a history of ingestion of Pb-containing paint since the age of 2 or 3 yr is presented. Upon admission to the hospital, the Pb level was 80 μg/100 ml in the blood and 88 μg/24 hr in the urine. There was increased bone density in the metaphyses of the femurs, tibias, fibulas, radiuses, and ulnas. The child was treated with $CaNa_2EDTA$ and the Pb level in the blood decreased to 40 μg/100 ml. After follow-up examinations, the patient was subjected to several more courses of EDTA therapy. Since the family could not be relocated, the child was sent to live with an aunt in a good environment.

In the past 2 yr, the fatality rate in Pb poisoning has been reduced markedly primarily because of intensified case finding techniques that result in earlier treatment.

3028 Leikin, S., and Eng, G. (Children's Hospital, Washington, D.C.): ERYTHROKINETIC STUDIES OF THE ANEMIA OF LEAD POISONING. Pediatrics 31:996-1002 (June), 1963.

Erythrokinetic studies using ^{59}Fe and ^{51}Cr simultaneously, and bone marrow myeloid-erythroid counts were performed on 7 children, aged 2-10 yr, who had suffered from Pb poisoning for a period of a few months to 8 yr. All children showed a microcytic, hypochromic anemia. Three patients with relatively short histories of Pb intoxication demonstrated a pattern characteristic of a hemolytic process. Three other ones with more prolonged histories displayed erythrokinetic patterns indicating erythroid hypoplasia. One child showed a normal pattern. These results of the study indicate that several mechanisms exist for the production of Pb anemia, depending on the duration of intoxication. Furthermore, Pb involves the blood and bone marrow in several ways.

3029 Lichtman, H.C., and Feldman, F.: (State Univ. New York; Maimonides Hosp., Brooklyn, N.Y.): IN VITRO PYRROLE AND PORPHYRIN SYNTHESIS IN LEAD POISONING AND IRON

DEFICIENCY. Journal of Clinical Investigation 42:830-9 (June), 1963.

Data on the δ-aminolevulinic acid dehydrase (ALA-D) activity and hematologic information was tabulated for 16 normal subjects, 9 children with Fe-deficiency anemia and 11 children with Pb poisoning. The activity of ALA-D, the enzyme necessary for conversion of ALA to porphobilinogen was significantly lower in Pb poisoning than in normal or Fe-deficient subjects. The ALA-D deficit could be reversed by preactivating the incubation mixtures with glutathione; however, glutathione preincubation did not augment in vitro porphyrin production from ALA. This seems to indicate a defect in the biosynthetic pathway for heme in the sequence beyond porphobilinogen.

3030 Newill, V.A., Sunshine, I., Griggs, R.C., Buchanan, S., and Herman, W. W. (Western Reserve Univ.; Cuyahoga Co. Coroner's Off., Cleveland, Ohio): LEAD POISONING IN CHILDREN. Medical Science 13:367-73 (Mar. 10), 1963.

The diagnosis and treatment of Pb poisoning in children is reviewed. Results of surveys for Pb poisoning among children in selected areas of Cleveland, Ohio, in 1959 and 1960 are presented in a table.

3031 Okazaki, H., Aronson, S.M., DiMaio, D.J., and Olvera, J.E. (Brooklyn, N.Y.): ACUTE LEAD ENCEPHALOPATHY OF CHILDHOOD. HISTOLOGIC AND CHEMICAL STUDIES, WITH PARTICULAR REFERENCE TO ANGIOPATHIC ASPECTS. Transactions of the American Neurological Association 88:248-50, 1963.

Histologic, chemical and clinical findings on a group of 23 children, aged 24-49 mo, all of whom succumbed to Pb poisoning during the warmer months of the year, were reported. The clinical course was similar in all these children; weeks of anorexia, irritability and periodic vomiting were followed by depressed consciousness and/or convulsions. The interval between the onset of clinically apparent encephalopathy and death was generally <72 hr. The concentration of Pb in the brain was measured in 6 cases. Highest levels were found in the hippocampal and frontal cortices, lowest levels in the occipital white matter and pons (0.712, 2.513; 1.210 and 1.329 µg/100 g wet tissue, respectively). The brains were swollen, showing a mean increase of 17.7% in weight. Characteristic histopathologic alterations were seen most consistently in the cerebrum and cerebellum. They suggested that the initial effects of Pb poisoning were selectively exerted upon the intrinsic blood vessels of small caliber where they caused increased permeability, focal necrosis, occlusion and the transudation of plasma fluid into the perivascular, interstitial and subpial spaces.

3032 Oropeza, P., and Morales Urbano, J.M. (Univ. Central de Venezuela, Caracas): La Intoxicación por plomo en el nino. Revision de cuatro casos. (LEAD POISONING IN THE CHILD. REVIEW OF FOUR CASES.) Gaceta Medica de Caracas 71:45-67 (Jan.-Dec.), 1963.

Since no information has yet been published in Venezuela on Pb poisoning in infants, this paper was planned to draw attention to these hazards. The etiology, pathology, manifestations of acute and chronic Pb poisoning, diagnosis and treatment are reviewed. Case reports of 4 infants who had been accidentally poisoned by inhalation of Pb fumes are given in detail.

The 1st case occurred in 1954 in a 9-mo-old child who was admitted to the hospital with a severe digestive syndrome and manifestations of the central nervous system. The parents were engaged in repairing storage batteries in their home and both had been suffering from chronic Pb poisoning for many years.

In 1962, the mother of the patient described above came to the hospital with 3 children who displayed symptoms comparable to those of 3 sons who had died within the past 8 yr, the last one only 1 mo previously. They all showed a moderate hypochromic anemia. The level of Pb in blood exceeded markedly the threshold limit of 0.050 mg/100 ml blood, urinary Pb excretion ranged from 0.060-0.182 mg/l urine before and from 0.430-1.800 after administration of $CaNa_2EDTA$. Determination for porphyrins was discussed, but was not carried out.

3033 Paine, R.S., LoPresi, J.M., and Guin, G.H. (George Washington Univ. School Med., Washington, D.C.): CLINICAL PATHOLOGICAL CONFERENCE: SHORT ILLNESS, COMA AND DEATH. Clinical Proceedings of Children's Hospital 19:322-33, 1963.

A 2-1/2-yr-old Negro boy was admitted because of vomiting, anorexia, and lethargy. On examination, he appeared chronically ill, poorly nourished, and comatose. He was given iv drip of saline and dextrose. Hematology showed 6.7 g/100 ml hemoglobin, hypochromic and microcytic red cells with moderate anisocytosis and poikilocytosis. When taken to the ward, the boy was in extremis and died shortly afterwards (1 hr 40 min after arrival in the emergency room). The family history did not help in establishing a diagnosis. He was a plump baby until 4 mo of age when he began to lose weight in spite of a good appetite; he was seen in the Outpatient Department 11 mo before admission because of a viral infection and was thought to have nutritional anemia but did not return for a hemogram. The final pathologic diagnoses upon autopsy were: (1) acute Pb encephalopathy, (2) interstitial pneumonitis, (3) anemia, (4) hepatomegaly, and (5) intranuclear inclusions in kidney and liver. A sample of brain tissue contained 0.256 mg Pb/100 g. X rays of the chest supported the diagnosis of Pb poisoning by the presence of lines of increased density at the proximal ends of the humeri.

3034 Popoff, N., Weinberg, S., and Feigin, I. (New York School Med., New York City): PATHOLOGIC OBSERVATIONS IN LEAD ENCEPHALOPATHY. WITH SPECIAL REFERENCE TO THE VASCULAR CHANGES. Neurology 13:101-12 (Feb.), 1963.

The neuropathologic findings in 6 children with Pb encephalopathy, aged 1.5-3 yr, 5 of whom had a history of ingestion of paint for 4-6 mo, were reported. Five died within 8 days of the onset of acute symptoms, the 6th child survived for 39 days. The clinical picture was characterized by vomiting, headache, drowsiness, stupor or coma, papilledema and alterations in pupillary size and reaction. Pathologically, considerable swelling of the brain was evident in the 5 acute cases; 1 of these showed petechial hemorrhages in the cortex of 1 occipital lobe. Microscopically, 4 showed partial loss of myelin and an astrocytic reaction in the white matter. Three showed perivascular edema and petechial hemorrhages. The chronic case revealed extensive tissue destruction with cavity formation, associated with marked astrocytic and microglial reaction, thickening of the veins with cellular disorganization of their walls, and very recent thrombosis of dural sinuses. The pathologic appearance suggested to the authors that vascular damage is a major factor in the pathogenesis of the cerebral disorder. (26 references)

3035 Smith, H.D., Baehner, R.L., Carney, T., and Majors, W.J. (Univ. Cincinnati, O.): THE SEQUELAE OF PICA WITH AND WITHOUT LEAD POISONING. A COMPARISON OF THE SEQUELAE FIVE OR MORE YEARS LATER: I. CLINICAL AND LABORATORY OBSERVATIONS. American Journal of Diseases of Children 105:609-16 (June), 1963.

Four groups of 10 children each were studied. The patients in Group 1 had been diagnosed 5 or more years prior to this study as having Pb encephalopathy; all children demonstrated (1) excessive Pb absorption as indicated by a history of pica and a Pb level in the blood of ≥0.06 mg/100 g, (2) signs of involvement of the central nervous system, and (3) a protein level in the cerebrospinal fluid >40 mg/100 ml. Group 2 consisted of children who had pica 5 or more years prior to this study, and had absorbed an excessive amount of Pb as indicated by Pb levels in the blood of ≥0.06 mg/100 g, but who had not displayed effects on the central nervous system and changes in the cerebrospinal fluid. Group 3 consisted of children suspected of possible Pb poisoning because of a distinct history of pica, but with a Pb concentration in the blood <0.06 mg/100 g and with a urinary content of Pb also within the normal range (0.02 mg/l). Group 4 served as controls. The age of the children at the time of the original illness was 9-40 mo and 6 yr 2 mo to 11 yr 3 mo at the follow-up examination.

Except for the presence of seizures or other neurologic sequelae among the children with prior Pb encephalopathy, none of the children in this study showed signs or symptoms suggestive of organic, nonbehavioral residuals. The incidence of recurrent convulsions was 40% among those with Pb encephalopathy while an additional 20% had other manifestations of neurologic damage, presumably due to Pb. Abnormal electroencephalographic patterns were found twice as often in the patients with Pb encephalopathy as in other groups. Neither pica nor Pb absorption without encephalopathy increased the incidence of these abnormalities over the 30% incidence observed in the controls. The incidence of pica among the controls was 20%. No abnormalities were observed on follow-up X-ray examination except faint scars at the sites of the original "Pb lines" in one third of the children who had previously had Pb encephalopathy or absorption. Since the blood level of Pb was within elevated range in 3 children with prior Pb poisoning and in 1 child previously diagnosed as having pica without excessive Pb absorption, children with prior plumbism or with pica must be observed repeatedly during follow-up.

It is concluded that Pb poisoning causes significant physical and laboratory sequelae only if it is associated with encephalopathy. Neither uncomplicated Pb poisoning nor pica without Pb intoxication resulted in physical or laboratory abnormalities 5 yr later.

3036 Tepper, L.B. (Harvard School of Public Health, Boston, Mass.): RENAL FUNCTION SUBSEQUENT TO CHILDHOOD PLUMBISM. Archives of Environmental Health 7:76-85 (July), 1963.

A striking epidemic of apparently Pb-induced renal disease in Australia was the initial stimulus for the Massachusetts investigation of 165 persons who had been intoxicated with Pb in childhood >20 yr ago and who had shown unequivocal evidence of Pb intoxication but had survived the acute episode. Admission to this study group required that any 2 of the following 3 diagnostic criteria be fulfilled: (1) a definite history of pica for Pb-containing material (usually paint) or the use of Pb nipple shields; (2) X ray evidence of typical Pb-induced skeletal alterations; (3) clinical evidence of symptoms and signs characteristic of childhood Pb intoxication affecting 2 or more organ systems. Of the 165 persons, it was possible to obtain information on the health status of 139 (84%). Ten of these had died after the initial intoxication (3 due to confirmed Pb poisoning at age 2; 1 at 23 from chronic renal disease of uncertain etiology; the rest from accidents or other unrelated causes). Screening tests of renal function in 42 subjects of the group yielded no convincing evidence of chronic renal impairment. The difference between sequelae of plumbism in Massachusetts and Australia and possible causes for this variation were discussed. Based on the Massachusetts results it was concluded that it is not likely that body burdens of Pb associated with urban air contamination will induce chronic renal disease in persons so exposed.

3037 US Public Health Service, National Clearinghouse for Poison Control Center: LEAD POISONING SCREENING TEST STUDY. Washington, D.C., July-Aug., 1963, 6 pp.

A pilot study to determine the efficacy of various screening tests for Pb poisoning was carried out on 966 Ohio children, aged 18-36 mo, from neighborhoods suspected of having a high incidence of Pb poisoning. Pb levels in blood and urine and urinary ALA and coproporphyrin (CP) were determined, and the upper limits of normal for these 4 biochemical tests were set as follows: blood Pb, 0.06 mg/100 g of blood; urinary Pb, 0.08 mg/l of urine; urinary CP, 50 μg/100 ml of urine; urinary ALA, 0.6 mg/100 ml of urine. Of the 966 children in the survey, 866 had all 4 tests. Of these, 726 were negative to all tests and only 1 was positive by all tests. Of the 42 children with positive blood Pb, only 3 reacted positively in the other tests and only 2 of these had positive urinary Pb. The conclusion was drawn that the concentrations of ALA, Pb and CP in a casual urine specimen cannot be relied on for screening purposes to predict blood Pb levels. The most workable technique appears to be analysis of the blood for Pb.

3038 Valori, P. and Melchiorri, C. (Univ. Rome, Italy): Il potere aggressivo del latte materno sopra il piombo dei paracapezzoli quale causa di avvelenamento nel lattante. (THE POWER OF MATERNAL MILK TO ATTACK THE LEAD OF NIPPLE PROTECTORS AS A CAUSE OF LEAD POISONING IN INFANTS.) Nuovi Annali d'Igiene e Microbiologia 14:117-32 (Mar.-Apr.), 1963.

The process by which the Pb contained in Pb nipple protectors is first absorbed by the mother and then ingested by the infant, was studied. The author describes in great detail a method of determination for Pb, using dithizone. By means of this technique, the Pb content was estimated in cow's and human milk to be 50-160 (mean 90) and 20-60 μg/l, respectively. Subsequently, the capacity of both cow's and human milk to react with the Pb in the nipple shields was studied by immersing the shields at 37° C in various amounts of milk, for various periods of time. It was found that human milk dissolves a greater amount of Pb than does cow's milk. Since the estimate indicated daily deposition of Pb on the breast of >1 mg, considerable amounts could reach the mother's milk by absorption through the skin. Therefore, Pb nipple protectors are potentially harmful. The immediate discontinuance of their use was strongly recommended.

3039 Yue, F.C. (Natl. Taiwan Univ. Hosp, China): LEAD POISONING; A CASE REPORT. Acta Paediatrica Sinica 4:143-8 (Apr.-June), 1963.

Following a review of the literature, a case of Pb poisoning in a 15-yr-old workman in a storage battery factory for ~1-1/2 yr is described. He was admitted to the Pediatric Ward with intermittent abdominal cramps and generalized convulsive seizures. The main signs and symptoms were typical of Pb poisoning: pallor, abdominal cramps, vomiting, mental confusion, restlessness and irritability, generalized convulsions, Pb line, hypochromic microcytic anemia with stippled erythrocytes, coproporphyrinuria, positive skin test with Na sulfide and increased density at the epiphysis of long bones upon X ray. The boy was treated with BAL and other supportive measures, but there was no improvement and he died 3 days after admission.

The author stresses the importance in correct diagnosis of establishing the source of Pb, particularly in children, together with the classical signs. The use of CaEDTA is mentioned as being highly effective; formerly it was considered to have no side effects; however, deaths from renal failure because of improper use have been reported. Where EDTA is not available, BAL may be used. The treatment of Pb encephalopathy with urea, hypothermia, and surgical decompression is also mentioned. (From author's English summary; 20 references)

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3040 Andelman, S.M. (Chicago, Ill.): LET'S GET THE LEAD OUT. Journal of the American Medical Association 187:770 (Mar. 7), 1964.

The causes of Pb poisoning in children living in large cities are reviewed and the program of the Chicago Board of Health for the prevention of such poisonings is discussed. Since in spite of the measures taken new cases continue to occur, Pb poisoning has been made a reportable disease this year. When a large number of cases occur, a door-to-door campaign, inspecting premises and correcting conditions, is undertaken. While Pb poisoning has been successfully prevented in most areas of Chicago, it still needs to be eliminated in areas where neglect and ignorance prevail.

3041 Anonymous: LEAD POISONING IN CHILDREN. British Medical Journal 1:1200-1 (May 9), 1964.

In this "leading article," it is pointed out that childhood Hg poisoning has virtually disappeared since the principal cause of it, calomel, has been withdrawn; also, that although the means of prevention of Pb poisoning are clear, though not so easy to accomplish, Pb poisoning is still widespread. An important part in bringing cases to light has been the introduction of readily available methods of estimating the level of Pb in the blood, although in some cases the blood levels may not be raised, and the height of the level (an upper limit of 36 μg/100 ml recently proposed by A.A. Moncrieff) does not necessarily correspond to the severity of the condition.

Recent studies of the incidence, cause and diagnosis of childhood plumbism are discussed (Moncrieff, et al; R.C. Griggs, et al). Emphasis is laid on early diagnosis which is difficult because of frequently bizarre onset of illness, and can no longer depend upon the former classical signs of punctate basophilia, Pb lines in gums, bands of increased density of bones, and others, for by the time these appear, irreparable damage may have been done. A history of pica is always suggestive and flaking paint inside old homes is the commonest cause of Pb poisoning. The importance of notifying local public health authorities is stressed, so that steps can be taken to remove the cause and ensure proper care of affected children.

Although treatment of choice now is EDTA, either intramuscularly or intravenously, Moncrieff, et al favored penicillamine which could be administered orally. B.F. Andrews (1961) warned, however, that use of EDTA may cause kidney damage, and B.D. Dinman (1962) pointed out a disadvantage of both chelating agents in that there is no evidence that their action extends to bone where most of the Pb is stored. The article closes by emphasizing again that prevention must be the first aim.

3042 Anonymous: LEAD IN TOYS. Information Bulletin B.I.B.R.A. (British Industrial Biological Research Association) 3:462

(Oct.), 1964.

A case of Pb poisoning in a 4.5-yr-old child, reported to the Hampstead Health Department, led to an appeal to the Home Office for a ban on the sale of plastic toys with a high Pb content. Some of the child's toys contained Pb at concentrations of 258-1970 ppm, and showed signs of having been chewed on. Other plastic toys sold in local shops had comparable Pb levels. According to the public analyst, these toys constitute a real source of danger if chewed or sucked by a child or even an adult.

3043 Anonymous: LEAD POISONING IN CHILDREN. Lancet 1:867-8 (Apr. 18), 1964.

The importance of prompt treatment with $CaNa_2EDTA$ in children with Pb poisoning is emphasized. The diagnosis of Pb poisoning should be considered in children with unexplained anemia, convulsions raised intracranial pressure, renal glycosuria and amino-aciduria, and abdominal pain, especially during the 2nd and 3rd yr of life. An inquiry about pica should be a routine part of history-taking. The sources of Pb absorption and essential diagnostic factors are presented. Among these, the blood-Pb values are discussed in greater detail on the basis of the report by A.A. Moncrieff et al at Great Ormond Street, who found Pb in the blood of all but 2 of 80 normal children to be <36 μg/100 ml, although the upper limit has been usually regarded as 50-60 μg/100 ml, allowing for an overlap between the values in normal and poisoned children. Moncrieff's acceptance of the 36 μg as the upper limit, and the finding of abnormal blood-Pb in 45% of 122 children with severe mental subnormality or behavior disorders, also in 30% of children with apparent encephalitis, and in 54% of children with abdominal pain, pica, vomiting, anemia, or irritability, caused the Editor to raise the question whether all these children were suffering from Pb poisoning and to state that a blood-Pb of 40-50 μg/100 ml may mean no more than that the patient has pica because of mental abnormality due to a cause other than Pb poisoning. He points out that the introduction of the determination of blood-Pb, and the easy access to a test requiring only a single specimen of blood, led to increased frequency of diagnosis of undoubted Pb poisoning which would have been difficult to recognize by the usual method. He recommends that other centers also provide facilities for this test.

3044 Astolfi, E. (Children's Hosp., Argentina): Terapeutica y profilaxis de las intoxicaciones de la infancia. (THERAPEUTICS AND PROPHYLAXIS OF INTOXICATIONS IN INFANCY.) Semana Medica 124:186-90, 194 (Jan. 2), 1964.

The availability of BAL and EDTA in heavy metal poisonings, particularly in Pb poisoning, as well as that of PAM in the treatment of anticholinesterase insecticide poisoning in children is discussed. The activities of the Poison Control Centers and of the National Clearinghouse in US are described.

3045 Astolfi, E., Rocatagliata, M., Gimenez, E.R., Izurieta, E.M., and Grippo, J. (Buenos Aires, Argentina): Sintomatologia proteiforme de la intoxicacion plumbica. (THE PROTEAN SYMPTOMATOLOGY OF LEAD POISONING.) Archivos Argentinos de Pediatria 62:40-5 (July-Sept.), 1964.

Eight cases of Pb poisoning were reported, 7 in children aged 2.5-10 yr and 1 in an 18-yr-old boy. There were 4 cases of pica among the group. The manifestations varied from headaches, colic, anemia, paresthesia, urinary disturbance, to paralysis and encephalopathy. Coproporphyrinuria was positive in all cases. A count of stippled erythrocytes was made in 5 patients, with positive results being found in 3. Determination of the Pb level in blood in 6 cases revealed a Pb content exceeding 60 μg% (up to 140 μg%) in 5 of them. All patients were treated with $CaNa_2EDTA$ at a dose of 75 mg/kg body weight/day, and in 1 case iv injections of Ca gluconate were also given. In a 5-yr-old girl, symptoms of endocranial hypertension improved by iv administration of urea and corticoadrenal hormones.

In his discussion, the author points to the variable symptomatology in these cases, as well as to the fact that childhood poisoning may occur by inhalation as well as by ingestion. Aside from the pica, one case of illness was incurred in a home printing shop (10-yr-old); one (8-yr-old) worked with his father and brother in a storage-battery factory; and the 3rd of the inhalation cases (18-yr-old) lived next to a workshop the chimney effluents of which traversed the common wall.

3046 Berg, J.M., and Zappella, M. (Harperbury Hosp., Shenley, Hertsh., England): LEAD POISONING IN CHILDHOOD WITH PARTICULAR REFERENCE TO PICA AND MENTAL SEQUELAE. Journal of Mental Deficiency Research 8: 44-53 (June), 1964.

The case reported is that of a boy with pica who became an idiot following the ingestion of garden soil contaminated by Pb. This contamination was thought to be due to the burial of old paint. A random sample of the soil was found by local public health authorities to contain 0.22% Pb. The boy was the only patient among ~1000 consecutive admissions of idiot and imbecile children to the Fountain Hospital from 1950 through 1962, whose mental defect could be reasonably attributed to Pb poisoning. The first evidence of abnormality was observed at the age of 2.5 yr when the child started to indulge in persistent rocking and head banging at night. At 2 yr 11 mo he developed a pyrexial illness with diarrhea and vomiting. When he did not respond to antibiotic therapy, he was transferred, after 1 mo, to the Hospital for Sick Children, Great Ormond Street. At this time, his Hb was 79%, he showed stippled erythrocytes and the cerebrospinal fluid contained 150 mg proteins/100 ml. Pb poisoning was suspected and confirmed by a Pb content of 35 μg/100 ml urine and 117 μg/100 ml blood. He was treated with EDTA (0.5 g/12 hr) by iv drip, in 2 courses of 3 days each. Although the Pb concentration in the blood fell to 7-21 μg/100 ml, he remained grossly mentally retarded with spastic limbs and increased tendon jerks. At 4.5 yr he was functioning at the level of a 9-mo-old normal infant. At the time of this publication he was 6 yr old and not improved.

In reviewing the incidence of Pb poisoning in childhood in Great Britain, where it is stated to be rarely reported, 36 cases are tabulated as to available data, including author, source of Pb, age at time of acute illness, presence of encephalopathy, and follow-up findings. The significance of pica in the genesis of Pb intoxication is pointed out. In discussing sequelae of Pb poisoning in children, the author states that such severe impairments as in the above reported case are unusual, but that less obvious sequelae may often be missed, thus leaving the impression that Pb poisoning in childhood is more innocuous in regard to subsequent mental development than is actually the case.

3047 Bishop, P.: A DOCTOR TURNS DETECTIVE. Public Health (Johannesburg) 64:33-5 (May), 1964.

Pb poisoning as the cause of mental disturbance in children is discussed. Examples are quoted of children contracting Pb poisoning by sucking Pb-painted toys, playing with Pb-containing putty, handling Pb-containing sprays, etc. Although in some cases permanent damage may remain, all symptoms often disappear when the source of Pb is removed. High credit is given to London's Great Ormond Street Hospital for Sick Children which has set it as its goal to diagnose and possibly cure mental disease due to excessive absorption of Pb and to explore whether metals other than Pb also cause mental disorders in children.

3048 Christian, J.R., Celewycz, B.S., and Andelman, S.L. (Board of Health, Ill.): A THREE-YEAR STUDY OF LEAD POISONING IN CHICAGO. PART I: EPIDEMIOLOGY; PART II. CASE FINDING IN ASYMPTOMATIC CHILDREN USING URINARY COPROPORPHYRIN AS A SCREENING TEST. American Journal of Public Health 54:1241-51 (Aug.), 1964.

I. The diagnosis of Pb intoxication may be suspected, when one or more of the following criteria are present; among such criteria, the authors consider a history of pica, X-ray evidence of radiopaque material in the gastrointestinal tract, and of "Pb" lines at the metaphyseal ends of the long bones, to be suspicious evidence; elevated Pb content of blood or urine to be possibly equivocal; and the signs and symptoms of intoxication of the central nervous system, vomiting and other gastrointestinal disturbances, reducing substance in the urine, anemia, basophilic stippling of red blood cells, and the positive test for coproporphyrin III, as strongly indicative. Kehoe is cited as regarding the last-named test as the first sign of Pb poisoning.

From 1959 through 1961, of the total of 9,853 cases of accidental poisoning reported to the Chicago Board of Health, 429, or 4.7%, were due to exposure to Pb, of which 67 were fatal (79% of total deaths). Pica, with positive history of the ingestion of Pb, was found in 59.7% of the cases; in 2.6% of these, the ingestion of Pb was not proved. The highest incidence and the highest rate of mortality occurred in children 12 to 36 mo old. Peak periods of occurrence were June through September. However, in December 1959, 17 cases of poisoning resulted from the burning of storage batteries, and the inhalation of Pb fumes. Neither sex nor race seemed to be a predisposing factor. Since the greatest number of cases came from the nonwhite slum areas, the environment, in addition to age, is significant.

II. A survey was made, by the Chicago Board of Health, of 1.500 children residing in 3 different Chicago areas, to evaluate the use of urinary coproporphyrin (CP) determinations as a screening test for case finding in asymptomatic children. The first area in which a high incidence of Pb poisoning was known to exist, had buildings >50 yr of age and in poor repair; in the 2nd and 3rd areas, the buildings were relatively new and no cases of Pb poisoning had been reported during the past 3 yr. However, the 3rd area was close to a blast furnace, and the concentration of Pb in the air in the immediate vicinity was found to be ~10 times as high as it was in other areas of the city.

The parents of children, aged 1-5 yr, and the physicians in these areas were informed of the program. The public health nurse was instructed to collect a minimum of 1 oz of freshly voided urine and to take this to the Board of Health laboratory within 4 hr. Urinary CP was determined by the methods of Benson and Chisholm.

In Area 1, 91 children (18% of these studies) were found to have positive urinary CP. Of these, 44% revealed clinical and/or laboratory evidence compatible with the diagnosis of Pb poisoning (increased blood Pb, X-ray evidence of Pb deposits in the long bones or in the gastrointestinal tract.) Area 2 yielded only 14 or 2.8% patients with positive urinary CP; only 3 exhibited evidence of significant exposure to Pb. In the 3rd area, 16 or 3.2% patients showed positive urinary CP, only 1 of whom had a borderline blood Pb level. (Abstracts prepared by R.A. Kehoe, M.D.)

(Comment by Dr. Kehoe: Contradictions appear to exist between certain of the findings of this investigation and the conclusions arrived at. Thus reference is made to elevated levels of the concentration of Pb in the blood, and yet the tabulated data demonstrate that the concentration of Pb in the blood of the group of children that was most suspected of having abnormal quantities of Pb, ranged from 5-20 µg/100 ml. This is the low segment of the normal range which extends from 5-50 µg/100 ml blood. Nothing within this range can be regarded as abnormal, nor are such levels compatible with the induction of abnormal densities in the metaphyses of the long bones. One queries therefore whether analytical or radiologic technique was at fault. By the same token such analytical findings are incompatible with clinical Pb intoxication. It seems likely that the method of analyzing the blood for Pb yielded unduly low results, but the uncertainty in this matter is more than a little disconcerting.)

3049 Editorial: THE CASE OF THE NECKLACE - LEAD OR ARSENIC? New York State Journal of Medicine 64:1282-4 (June 1), 1964.

The paper "Lead intoxication in children - the case of the necklace" by L. Christiaens et al. (Abstract No. 3019) is reviewed. The author points out that the reported development of symptoms is not consistent with that usually observed in Pb poisoning in children, particularly the persistent severe colicky pain is not a manifestation of Pb poisoning in children. Examination of artificial pearls revealed that Pb carbonate, Pb phosphate, Pb arsenate and a Bi salt are used in the manufacture of such beads; Pb arsenate was present in 3 out of 5 beads tested. The author believes that the case was essentially one of As poisoning even though Pb was found present. In 1200 cases of Pb poisoning in children reported to the New York City Department of Health Poison Control Center, severe colicky pains and foul diarrhea were not among the signs and symptoms mentioned. As an obvious conclusion from these findings the author advises that beads be kept away from young children, because they may be coated with Pb compounds. The question is raised also why the child was not treated with EDTA, as this case was originally diagnosed as Pb intoxication.

3050 Griggs, R.C., Sunshine, I., Newill, V.A., Newton, B.W., Buchanan, S. and Rasch, C.A. (Western Reserve Univ., Cleveland, O.): ENVIRONMENTAL FACTORS IN CHILDHOOD LEAD POISONING. Journal of the American Medical Association 187:703-7 (Mar. 7), 1964.

Information collected during 1952 through 1958 has shown that ~8-9 Cleveland children were hospitalized per year for Pb poisoning, with a mortality of 30%; 85% of these cases were seen in the summer months; the majority came from the so-called "Pb belt" in Cleveland, an area characterized by old and generally substandard housing. The present study was carried out during the summer months of 1959 and 1960 in 4 census tracts within the "Pb belt"; 3 of the areas had old housing and one was a new housing project. The door-to-door survey included 994 children between the ages of 12 and 60 mo. In a questionnaire, the birth date of the child, condition of the home, history of previous poisoning and of any pica was listed. For purposes of this study, a child was classified as having Pb intoxication when any 3 of the following 6 factors were found; history of pica for paint, dirt or plaster; abnormal urine (levels of, or higher: 0.08 mg Pb or 0.200 mg CP III/1, 0.30 μM ALA/ml; Pb in the blood ≥0.06 mg%; Hb ≤10 g%; stippled red blood cells; abnormal radiographic findings (in wrists and knees; in a few children of radiopaque material in the abdomen): further, the child had to have at least an abnormal level of blood or urinary Pb or urinary CP III.

Of 906 urine specimens analyzed, 219 or 24% had at least one quantitative determination in the abnormal range: 14% had abnormal Pb levels, 13% abnormal CP III levels. Only 3% of the urine specimens were abnormal in tract 4 where the new housing was, while 25-37% were abnormal in the areas with old housing. No abnormal urines were found in 12 to 23-mo-old children in area 4 whereas 22-27% were abnormal in the other areas. A history of pica was noted in 22-50% of children, aged 12-35 mo, in tracts 1, 2 and 3 and in only 5% of tract 4. No significant relationship was observed in these children between pica and urinary excretion of Pb and CP III. A correlation of the presence of flaking paint on the outside or inside of the house with urinary findings and pica history showed that there was a significant positive association between the observation of flaking paint inside the house and the finding of abnormal urinary Pb or CP III excretion.

3051 Guerra Milligan, C.R., and Chaves Carballo, E. (Gorgas Hosp., Panama City): Intoxicacion por plomo en la infancia en Panama. (LEAD POISONING IN CHILDREN IN PANAMA.) Archivos Medicos Panamenos 13:63-9; in English, 70-4 (April), 1964.

The authors first state that the reported incidence of Pb poisoning in children is proportional to the interest and awareness of physicians. It is for this reason they have investigated this problem in Panama for Pb poisoning had been diagnosed there only rarely. Seventeen cases were seen in Gorgas Hospital from 1952-63, with the largest number in a single year, 4, occurring in 1958. In the last 3 mo of 1963, 3 cases were hospitalized. Of the 17 cases, 82% were from 1-4 yr, and the youngest, 9 mo. No greater incidence was noted in the lower economic classes nor in determinate urban areas; 10 were Panamanians and 7 Americans. Because of climatic conditions, no particular increased incidence was found during certain months of the year. Two of the 17 died within the first 24 hr with signs of severe encephalopathy. In 1, the final diagnosis was established by postmortem radiology and Pb determination in various tissues. In the 10 cases treated with EDTA excellent results were obtained. The authors point to the serious consequences of Pb poisoning in pica and urge that parents should be warned to this effect.

3052 Izurieta, M., Manterola, A.C., and Rinaldi, H. (Children's Hosp., Buenos Aires, Argentina): Insuficiencia renal en la intoxicacion plumbica. (RENAL INSUFFICIENCY IN LEAD POISONING.) Archivos Argentinos de Pediatria 62:46-50 (July-Sept.), 1964.

Chronic Pb poisoning in 2 children, aged 2 yr and 14 mo, respectively, was described. Both patients were affected with an intercurrent infection which resulted in acute renal failure. The fathers of both children worked as typographers. The older child had pica. Blood tests revealed a microcytic hypochromic anemia, resistant to Fe therapy, in both patients; both had positive coproporphyrinuria; the Pb content of their blood was 30 and 100 μg%, respectively. After reviewing some aspects of Pb poisoning in children the authors conclude that the acute renal failure was induced by the mobilization of Pb from the bones during the intercurrent infection.

3053 Jacobziner, H. and Raybin, H.W. (City of New York Dept. of Health): LEAD POISONING TREATED WITH BAL. New York State Journal of Medicine 64:441 (Feb. 1), 1964.

A 14-mo-old female child was admitted to the hospital for treatment of Pb poisoning, the diagnosis of which had been made on the basis of a history of pica and blood and urine determinations. For unknown reasons, the child was treated with a massive overdose of dimercaprol (BAL) which caused nausea, vomiting, excessive salivation, abdominal and chest pains, flushing of the face, muscular cramps and burning sensation of the skin.

The authors warn against the use of BAL and also remind physicians that EDTA has no accepted pediatric use. Recent reports recommend the use of D-penicillamine but it is not an officially recognized drug for Pb poisoning. During 1963 to Sept 25, 223 cases of Pb poisoning, of which 5 terminated fatally, were reported in New York City, and 156 with 6 fatalities during the same time the year before. All these cases occurred in children <6 yr of age and chiefly in the ages between 2-4 yr.

3054 Jacobziner, H. and Raybin, H.W. (City of New York Dept. of Health): "POSSIBLE" LEAD POISONING. New York State Journal of Medicine 64:1233-5 (May 15), 1964.

Many cases of Pb poisoning with blood Pb levels considerably above the presumed standard for positive diagnosis of 0.06 mg/100 ml have recently been labeled by the reporting hospitals as "possible" Pb poisonings. Six such incidents in children, aged 1.5-7.5 yr, with blood Pb levels ranging from 0.06-0.32 mg/100 ml, are described. The authors recommend that treatment should not be delayed in cases with a positive history of pica and blood Pb levels of 0.06 mg/100 ml and over. A possible new physical sign in the early diagnosis of Pb poisoning, that is a greyish stippling of Pb pigment that is circumferential around the optical disk, has been described by Sonkin in occupational Pb poisoning. Visualized through the ophthalmoscope, Pb particles appear as glistening, discrete grey pigment in the retinal area around the optic disk. The authors point out that they do not know whether or not such changes may occur in children suffering from Pb poisoning, but they consider them worth looking for.

3055 Koumidis, O. (London, England): LEAD POISONING AS A CAUSE OF MENTAL RETARDATION IN CHILDREN. In Forensic Immunology, Medicine, Pathology and Toxicology, Report of the Third International Meeting April 16-24, 1963. International Congress Series No. 80, Amsterdam Excerpta Medica Foundation, 1964, p. 97.

An investigation was carried out to elucidate whether mental retardation in some children may be caused by increased Pb absorption. The critical level for Pb, to reach its full toxic effect, is ~80 ug Pb/100 g whole blood. The clinical picture in children is different from that of adults. No case of even the mildest type of poisoning has been induced in children when the Pb level was <0.04 mg/100 g of whole blood. An increased content of ALA in the urine is regarded as an early sign of poisoning. At Great Ormond Street Hospital for Sick Children, there were 30 cases of Pb poisoning and 65 cases of mentally retarded children with high Pb concentrations in the blood and an increased content of urinary ALA. The author never found children with Pb poisoning whose Pb level in the blood was <0.045 mg/100 g of whole blood. Normal children, mentally defective children, children suffering from encephalitis and children with Pb poisoning were examined. The following data were found in 200 normal and 100 mentally defective children, respectively: Pb in whole blood, 0.014-0.030 and 0.040-0.080 mg/100 ml; pyruvic acid in blood, 1 and 1.4 mg/100 ml; ALA, 0.20-0.26 and 0.38 mg/100 ml urine. The mentally defective children who all had neurological symptoms improved greatly by treatment with a chelating agent. Half of the children with encephalitis had an average Pb concentration in the blood of 0.050 mg/100 ml and in some, pyruvate was 1.50 mg/100 ml blood. Neither ALA nor pyruvate levels were pathologically raised at Pb concentrations of <0.035 mg/100 ml blood. Oral administration of penicillamine shortened the metabolic disturbances caused by Pb and contributed to the intellectual improvement of the children.

3056 Lending, M., Slobody, L.B., and Mestern, J. (New York Med. College, New York): CEREBROSPINAL FLUID GLUTAMIC OXALACETIC TRANSAMINASE AND LACTIC DEHYDROGENASE ACTIVITIES IN CHILDREN WITH NEUROLOGIC DISORDERS. Journal of Pediatrics 65: 415-21 (Sept.), 1964.

Serum glutamic oxalacetic transaminase (GOT) in the cerebrospinal fluid and lactic dehydrogenase (LDH) activities were studied in 106 children with neurologic disorders, including 1 case of Pb encephalitis, and 41 neurologically normal children, ranging in age from 1 wk-11 yr. In the control group, GOT activity ranged from 2.0-15.0, mean 5.9, and LDH activity from 1.1-40.0, mean 14.3, units/ml/min. In the 2.5-yr-old child, suffering from Pb encephalopathy, GOT activity was 6.7 and LDH activity 12.3 units/ml/min. There was no correlation between GOT and LDH changes.

The authors consider that a study of these enzymes, particularly LDH, may be of assistance in the early differentiation between bacterial and viral meningitis. (No further reference to Pb encephalopathy is made aside from that above.)

3057 McIntire, M.S., and Angle, C.R. (Univ. Nebraska, Omaha): CHILDHOOD LEAD POISONING: NEUROLOGIC SEQUELAE. Nebraska State Medical Journal 49:412-8 (Aug.), 1964.

Following a brief outline of the etiology, physiology, diagnosis, treatment and prognosis of Pb poisoning in children, 8 cases, so diagnosed among 80,000 admissions in the Children's Memorial Hospital of Omaha in the 15-yr period from 1948 through 1963 are discussed. These children were followed for 17 mo-8 yr and 3 mo. In addition, a successful treatment of intrauterine Pb poisoning is reported for the first time. Pica for paint or soil was the antecedent in 4 children, aged 20 mo-3 yr. Subsequent analysis by health authorities revealed a Pb content of 26.6% in the paint in the home of the 20-mo-old boy who had been admitted to the hospital with acute hemiplegia followed by intractable seizures while a 2-yr-old had persistent strabismus. The 4 other children (aged 1.5-6 yr) came from a family which had used old battery cases as fuel in the living room stove. One of these children, a 3-yr-old boy, died of acute encephalopathy with convulsions despite treatment with $CaNa_2EDTA$. His 18-mo-old brother, at follow-up of 4 yr and 5 mo, showed persistent seizures, abnormal asymmetry, asynchrony and slow mental development. The 27-yr-old mother was 8 mo pregnant when her blood was found to contain 0.24 mg Pb/100 ml. She was treated iv with EDTA for 7 days. The child appeared normal at birth and at follow-up, 4 yr and 2 mo later, his electroencephalogram, mental development and neurological functions were normal.

In conclusion, the author points out that a history of pica should alert the physician to the possible diagnosis of Pb poisoning; that the parents should always be questioned concerning pica, and that Pb poisoning in pregnancy should be treated promptly.

3058 Marsh, F. (Epping, Essex, England): LEAD POISONING IN CHILDREN. Letters to the Editor. Lancet 1:941 (Apr. 25), 1964.

The author refers to the leading article on "Lead Poisoning in Children" in the April 18 issue of this journal. He points out that more emphasis should be laid on estimation of urinary Pb since levels >0.10 mg/l indicate trouble. Another sensitive and accurate procedure is the examination of blood films, stained with methylene blue. Marsh describes the case of a 3-yr-old child, not suspected of Pb poisoning, whose blood-film showed some unusual features. Further tests, including the demonstration of lines of increased density at the growing ends of bone, showed that the child had advanced Pb poisoning. Finally, he states: "Lead encephalopathy can occur without other classical signs of Pb poisoning, as I showed in the 1939-45 war for workers in leaded petrol."

3059 Miano, S. (Philadelphia Dept. of Public Health, Pa.): THE PROBLEM OF LEAD POISONING IN CHILDREN. Journal of Environmental Health 27:510 (July-Aug.), 1964.

Since 1950, 804 cases and 76 deaths of Pb poisoning in children have occurred in Philadelphia. The 1- to 3-yr age group accounted for 82% of the cases and 1/3 of these occurred in the 19-24 mo of age. The lower socioeconomic group provided 5 times as many cases as all other groups together, with mortality rate in this group of ~10%. The highest incidence of Pb poisoning is from May through October. Control of Pb poisoning requires legislation in combination with educational measures.

3060 Moncrieff, A.A., Koumides, O.P., Clayton, B.E., Patrick, A.D., Renwick, A.G.C., and Roberts, G.E. (Hosp. for Sick Children, London, England): LEAD POISONING IN CHILDREN. Archives of Disease in Childhood 39:1-13 (Feb.), 1964.

The present study was carried out primarily to see whether any children referred to the hospital for the investigation of mental retardation had Pb poisoning. As a preliminary, the normal range of Pb in the blood of children was determined. Eighty children, aged 4 mo-14.25 yr, who were neither mentally retarded nor had a history of pica, were found to have Pb levels in the blood of ≤36 μg/100 ml, with the exception of 2 children who had slightly higher levels. Thus, 36 μg/100 mg blood was taken as the upper limit of normal. Among 122 children, aged 6 mo-14 yr, who were mentally retarded, or had severe behavior disorders, 45% had Pb concentrations in the blood >36 μg. Among 40 children, aged 2 mo-12 yr, with a preliminary diagnosis of encephalitis, 30% had Pb levels >36 μg/100 ml blood. Among 52 children with severe anemia, pica or vomiting, 54% had Pb levels >36 μg/100 ml blood. Abnormally high pyruvate levels in the blood (normal upper limit 1.4 mg/100 ml) were found in 20 of 36 children with Pb levels >36 μg/100 ml blood. A group of 20 children, 13 boys and 7 girls, age 9 mo-5 yr, all with Pb poisoning, were studied in detail. Twelve came from families living in unfavorable conditions, 3 had access to putty containing red Pb, 4 or more had been eating old paint chippings, 2 had received home-grown vegetables produced on a soil containing Pb battery casings. One child was retarded and another was psychotic. Findings concerning blood Pb, punctate basophils, coproporphyrinuria and radiological evidence were tabulated. Anemia was common in all, but none showed aminoaciduria, glycosuria or a Pb line on the gum margins. All these patients were treated with oral penicillamine (150, 300 and 450 mg twice daily for children aged up to 5 yr, 5-10 yr and >10 yr, respectively). Four patients in addition received 1 or 2 courses of intramuscular $CaNa_2EDTA$ and 1 received 2 courses of iv EDTA (75 mg/kg body weight/day). The effects of the various treatments in some children are described.

The records of The Hospital for Sick Children showed that from 1951-1960, 12 children had been diagnosed as having Pb poisoning. Since 1961, when the estimation of blood Pb became freely available, it was apparent that the incidence of diagnosed cases had risen sharply (even by accepting the classical upper level of normal of 50-60 μg/100 ml blood). The diagnosis of established Pb poisoning usually presents no problem, but early Pb poisoning may mimic so many diseases that the diagnosis is difficult. The decision to treat or not to treat borderline cases depends on consideration of the whole problem. In this respect, the finding of a raised pyruvate level is considered as further evidence particularly when the increase of blood Pb has been "borderline." (However, the pyruvate level may be normal and the blood Pb very high.) Measures in the treatment of Pb poisoning are discussed and in the Appendix methods for the estimation of Pb in blood and urine are described. The authors point out that Pb levels in blood between 40 and 60 μg/100 ml should always be carefully considered in the light of other clinical findings, particularly when the child is <5 yr of age. (29 references)

3061 Park, E.A. (Johns Hopkins Univ. School of Med., Baltimore, Md.): THE IMPRINTING OF NUTRITIONAL DISTURBANCES ON THE GROWING BONE. Pediatrics 33:815-62 (May, Pt.II), 1964.

The clearly presented and thorough account of the response of the organism to nutritional disturbances is based on extensive experience gained in animal experiments and in clinical observations, including X-ray and histologic examination (whenever the latter were possible) of some 800 children, aged from birth to 14 yr, hospitalized in the Harriet Lane.

In the economy of the body of the young animal, when depletion of nutrients as caused by disease of all types becomes serious enough, the bones take up the burden by ceasing to grow. The body thus responds by sparing those organs on which continued existence depends. When the crisis is over, the bones proceed to grow again. The marks of this arrest in growth are visible in the X-ray film as transverse lines. The frequency of their occurrence has become appreciated only since the X ray has come into general use. The processes involved in the formation of the transverse lines has been studied on the rat by Park and Richter in order to clarify the basic mechanism involved. The results are detailed following a description of the cellular structure of bone with an explanation of the separate roles of the cartilage cells and osteoblasts, necessary for the understanding of the formation of arrest strata.

In the clinical observation of the 800 cases of children dying from all causes, but excluding in this series cases of Pb poisoning and those in which Bi or elemental P had been given, arrest lines were exceedingly frequent. They varied in number from 1 to several at single bone ends, and as to the bone on which they occurred. In no instances were they seen at the slow growing bone ends when they were not more numerous or better developed or both at the faster growing ones. There are instances when the arrest strata may be present but indistinguishable in the X-ray film. The reasons for this and for other factors, including conditions under which the strata may fail to form or may form incompletely, are explained. Growth-arrest strata may persist into adult life, although almost always they are resorbed as a result of remodelling before linear growth ceases. As advised by radiologists, transverse lines are only occasionally seen in the bones of adults.

The differences in the transverse lines as a consequence of nutritional stress, those occurring in certain diseases that grossly affect bone formation (rickets), lines of rarefaction seen in X-ray films, and those caused in poisoning by heavy metals and P are detailed. The lines caused under the latter conditions are entirely different from those caused by arrest of growth (or, as they should be more accurately termed, post-arrest lines, for they become evident because of the recovery following arrest). The lines caused by P and Pb poisoning are described as thicker strata which may be mm (Pb) or cm (P) thick, although they also may be line thin. The reason for this is that there is no interference with the continuation of cartilage (linear) growth and that the action is on all bone in process of formation, and constitutes an interference with the mechanism whereby normally surplus bone is removed (bone resorption). Pb is considered to retard bone growth. In chronic (childhood) poisoning the ingestion of Pb is almost always subject to variations at different times. Correspondingly in the films the bones register bands and lines of different thicknesses and intensities of radiopacity interspersed at irregular intervals. A characteristic picture, particularly if evidence in remodelling is also present, is a band 2-3 mm wide at the extreme ends of the fast growing bones together with lines and bands interspersed farther down the shaft. (27 references)

3062 Sartain, P., Whitaker, J.A., and Martin, J. (Univ. of Texas, Dallas): THE ABSENCE OF LEAD LINES IN BONES OF CHILDREN WITH EARLY LEAD POISONING. American Journal of Roentgenology, Radium Therapy and Nuclear Medicine 91:597-601 (Mar.), 1964.

Data are presented which show that Pb lines (metallic transverse bands at the ends of growing long bones) are absent in most cases of early Pb poisoning and that heavy transverse bands may be found in apparently normal children.

The policy followed in the authors' institution is to hospitalize all children with pica and basophilic stippling, and subject them to the versenate diagnostic test. Excessive ingestion of Pb is indicated by urinary Pb content of >500 µg/l after administration of versenate. Roentgenograms of the long bones of 31 children (9 mo-4.5 yr old) with Pb poisoning and 17 control children (10 mo-5 yr) were read independently by 3 observers. The Pb poisoning cases were divided into 2 groups on the basis of their pre-versenate urinary Pb levels: 14 with levels of <35 µg/l were included in the early Pb poisoning group; 17 with levels $\geqq 35$ µg/l or who had evidence of encephalopathy were placed in the late group. Only 17% of the patients with early Pb poisoning had positive or borderline roentgenograms, compared with 45% of the late cases. Four of 8 children with Pb encephalopathy had normal bone roentgenograms. Two of the 17 control roentgenograms were read as borderline by 1 observer, and 1 as positive by 2 and normal by 1 observer. This was a case of poliomyelitis with a history of pica who subsequently showed laboratory findings consistent with plumbism.

The conclusion was drawn that X-ray findings should be given secondary consideration when diagnosing Pb poisoning and that absence of Pb lines in the long bones should not discourage further search for chemical evidence of plumbism.

3063 Seto, D.S.Y., and Freeman, J.M. (Columbia Presbyterian Hosp., New York): LEAD NEUROPATHY IN CHILDHOOD. American Journal of Diseases of Children 107:337-42 (Apr.), 1964.

The major complications of Pb ingestion are encephalopathy and neuropathy. In children, encephalopathy is the most common consequence of Pb intoxication, whereas neuropathy is rare, only 9 cases having been reported in detail in the English literature, and 31 other cases mentioned.

A case of peripheral neuropathy due to Pb poisoning in a 3.5-yr-old male child is described. The child had a 2-yr history of pica and had chewed several holes in the plaster of his apartment. After anemia and weakness of 2-mo duration, he developed a sore throat with vomiting and complaints of pain in the thighs and legs. Neurologic examination revealed profound symmetrical distal weakness of all extremities and some proximal weakness so that the child could not support his weight. Laboratory tests showed rare basophilic stippling, increased excretion of urinary coproporphyrins; ALA excretion was 192.5 µM/day, compared with a normal value of 20 µM/day. The Pb concentration in whole blood was 5 µg/100 ml. X rays revealed dense metaphyseal bands in the long bones. Urinary Pb was within the normal range prior to administration of CaNa$_2$EDTA, but increased 1000-fold after treatment with EDTA (2 courses of 7 days each of 75 mg/kg/day, given iv in divided doses). The child recovered completely within 6 mo. A discussion of the findings in comparison with those reported earlier led to the conclusion that the determining factors in Pb-induced neuropathy or encephalopathy must remain speculative.

3064 Surand, H. (St. Mary's Hosp., London, England): VISCERAL LARVA MIGRANS. TOXOCARA CANIS INFECTION. Lancet 1:1357-9 (June 20), 1964.

The case of a 19-mo-old girl who had been eating peeled plaster from the kitchen wall and backyard dirt fouled by a neighbor's dog is presented. Pb poisoning was excluded (27 µg Pb/100 ml blood; normal EDTA excretion in urine). Investigation revealed a persistent eosinophilia, an enlarged liver and spleen, hyperglobulinemia, a raised anti-A and anti-B titer, and a positive toxocara skin test. Two round worms (Toxocara canis) were found in the feces of the dog. This was the 1st case of visceral larva migrans, due to Toxocara canis infection reported in a London-born child.

3065 Smith, H.D. (Univ. Cincinnati, Ohio): PEDIATRIC LEAD POISONING. Archives of Environmental Health 8:256-61 (Feb.), 1964.

A review of the manifestations of pediatric Pb poisoning and its differences from the adult disease is presented. Pb poisoning in children develops gradually, requiring persistent ingestion of Pb-containing substances over a period of at least 3 mo. During the hot summer months, acute manifestations may develop, indicating involvement of the central nervous, gastrointestinal or hematologic systems. For early recognition of the disease, judicious use of 4 laboratory tests - blood examination for anemia and erythrocytic stippling, X rays of the long bones for "Pb lines" and of the abdomen for radiopaque flecks within the intestines, and urinalysis for coproporphyrins - is essential. If any 2 of these tests yield positive evidence, a tentative diagnosis of plumbism should be made, a precise analysis for Pb in the blood should be obtained and the possibility of encephalopathy considered. Pb poisoning is most common among children, aged 15-36 mo, residing in older, impoverished areas where the walls of the houses have been painted repeatedly and are now in poor condition. Patients once treated must be watched for recurrences and their siblings checked carefully for the disease. Treatment does not prevent fatality in 25% of the cases with encephalopathy nor a high incidence of neurologic and behavioral sequelae. Therapy includes termination of exposure to Pb, removal of Pb from the body through the use of chelates such as ethylenediaminetetraacetate and dimercaptopropanol, symptomatic treatment for encephalopathy and prevention of re-exposure to Pb. (From author's summary) (19 references)

3066 Tiboni, E.A. (Dept. Public Health, Philadelphia, Pa.): CONTROL OF CHILDHOOD LEAD POISONING. Public Health Reports 79:167-74 (Feb.), 1964.

A review of the nature, sources and extent of Pb poisoning indicates that it is a cause for major concern as a health hazard to children <5 yr of age, both in urban and rural areas. As a result of the recent practice of obtaining blood Pb levels in children who exhibit pica but are asymptomatic, the definition of Pb poisoning is apparently changing. Diagnosis is being made with increasing frequency on the basis of elevated levels of Pb in the blood without any symptomatic manifestations of poisoning.

Reporting of Pb poisoning to the Philadelphia Department of Public Health has been mandatory since 1950. The results of systematic investigation of all reported cases by the Department over a period of >7 yr showed that <65% of the cases could definitely be attributed to paint as a source of Pb; a toy was determined as the source in 1 case. There are many other known and suspected sources; an attempt to list these in order of likelihood of cause has been made by this Department. The program, as developed in Philadelphia, is described in detail. This includes seeking the cooperation of landlords in the voluntary removal of Pb paint when it is found to be the source, epidemiologic investigation, education of the public, aside from the necessary laboratory services, and medical attention. A major limitation of the program has been the lack of legal powers to enforce removal of environmental hazards when they are discovered.

The number of cases reported, and deaths among them, in recent years are summarized for Philadelphia, Chicago, Baltimore, St. Louis, New York City, and Cincinnati. On the basis of this experience the author recommends preventive measures that must include screening of subclinical cases, early and rapid diagnosis, routine reporting, epidemiologic investigation, environmental appraisals, education and counseling, enforcement of legal standards, and adequate laboratory and social services. Minimization of the disease and its sequelae is as important as prevention. Research is needed into overt and underlying causes; social, economic and cultural factors; physical and psychiatric aspects of the condition and its causation, and measures to control environmental hazards. (23 references)

3067 Van Lookeren Campagne, W. (Leerdam, Holland): Enige gevallen van chronische loodintoxicatie bij kinderen. (CASES OF LEAD POISONING IN CHILDREN.) Maandschrift voor Kindergeneeskunde 32:195-204 (May), 1964.

Five cases of chronic Pb poisoning in children living on the same street, are reported. The patients were 3-14 yr old. Pb poisoning was diagnosed on the basis of clinical and laboratory tests. All showed stippled erythrocytes; the hemoglobin content was 50-80%; the concentrations of Pb in blood ranged from 79-100 µg/100 ml, and in urine from 150-275 µg/l.

Inquiry into the cause of poisoning in the first case so diagnosed revealed that the family dealt in scrap metal; in fact, there were several such workshops in the dwelling units on the street. As the families appeared to live as a clan, with the units interconnected by doors, the children played in the workshops. Two of the children were treated 1st with daily doses of 20 g Na citrate; all of them were given 3-4 g of CaNa$_2$EDTA/day.

The results were disappointing, partly due to social conditions which precluded adequate measures against continued exposure to Pb. The author questions the value of treatment of chronic Pb poisoning and stresses the need of prevention.

3068 Woods, G.E., and Walters, R.M. (Hortham Hosp., Almondsbury, England): LEAD POISONING IN MENTALLY SUBNORMAL CHILDREN. Letter to the Editor. Lancet 2:592 (Sept. 12), 1964.

The finding by A.A. Moncrieff et al (Abstract No. 3060) that the Pb levels in the blood of mentally retarded children and those with behavior disorders were frequently higher than in normal children, prompted the authors to investigate some 20 such patients in their hospital (out of 100). Among them were 5 with cerebral palsy, who had never been able to put anything in their mouths, and who showed an average concentration of Pb in blood of 13 μg/100 ml. Among 12 others showing >40 μg were 3 children in whom Pb poisoning was suspected as the primary cause of their mental deficiency: (1) A boy, now 18 yr old, who had begun to show mental retardation from age of 18 mo., showed in 1964 a level of 68 μg Pb in 100 ml blood, which dropped to 39 μg after treatment with penicillamine. Scrapings of paint of the cot that he had used as a child contained 6.76% Pb. (2) A girl, now 12 yr old, who had chewed objects as a baby and still had severe epilepsy and abnormal electroencephalogram, showed 60 μg Pb/100 ml blood, and after 1 mo's treatment with penicillamine, 16 μg. (3) A boy, now 9 yr old, had 1st exhibited signs of mental deterioration at age of 2-1/2 yr. His blood contained 137 μg Pb/100 ml, and 37 μg after 1 mo's treatment with penicillamine. His pica was still uncontrollable as he was found to be eating putty containing red Pb, which caused his blood Pb to rise to 80 μg.

The authors point out that these findings suggest that the incidence of Pb poisoning as a cause of mental deficiency is >1/1000 found by J.M. Berg et al (Abstract No. 3046), and that routine blood-Pb determinations in any child who exhibits unexplained epilepsy, mental deterioration, or psychotic behavior (regardless of pica) might reveal further cases.

V. OCCUPATIONAL EXPOSURE

1950

3069 Arkhipov, A.S., Rozenberg, S.A., and Smirnova, V.G. (Gorki Fed. Sci.-Res. Inst. Ind. Hyg. Occup. Dis., Min. Health, USSR): Gigienicheskoe znachenie deponirovaiya toksicheskikh veshchestv v stroitel'nykh materialakh. (HYGIENIC SIGNIFICANCE OF DEPOSITION OF TOXIC SUBSTANCES IN BUILDING MATERIALS.) Gigiena i Sanitariya 1950, No. 3:3[illegible]

Appreciable amounts of toxic substances (TEL, benzene, P, C disulfide, Hg and 1,2-dichloroethane) are found in the structural materials of industrial buildings such as lumber, brick, concrete and plaster. Substances like 1,2-dichloroethane usually reach maximum absorption values within 1.5 hr of exposure, but TEL absorbs more slowly (≦20 hr). The time of average exposure, concentration, nature of the materials and other factors affect the amounts of absorbed material. Oil-paints are very susceptible to uptake of chlorinated solvents, but that of C disulfide is sharply reduced. Plaster composition of 1 part lime (containing Si dioxide 53, ferrous oxide-ferric oxide 20-30, Mn oxide 10-20%), and 2 parts of sand shows little or no absorption of TEL.

3070 California Department of Public Health: CALIFORNIA'S EXPERIENCE IN LEAD STORAGE BATTERY INDUSTRY. Occupational Health Bulletin, Investigation Report No. 6, June 1950.

In a recent survey 19 of the 37 Pb storage battery plants operating in the State were visited. The presence or absence of controls are tabulated. Appendices to this report list recommendations for prevention and control of Pb exposure. For one of them, medical and health problems are discussed and emphasis is placed on the economically justified investments made in spending money on improvement of working conditions of the employees.

3071 Cary, W.H., Jr., and Valaer, P.J. (Distr. of Columbia Health Dept., Washington): OCCUPATIONAL HEALTH HAZARDS. Journal American Water Works Association 42:485-9 (May), 1950.

Exposure to Pb is listed as a hazard in the following operations: auto body and fender repair, degreasing, calking pipes, painting and welding. The garage mechanic may be exposed to Pb through contact with ethyl (Pb) gasoline, in the use of metalizing spray and in grinding off Pb filling in body and fender work.

3072 De Oliveira, O.G., and Cavalcanti, T.: (PLUMBISM IN THE PRINTING INDUSTRY.) Mem. Inst. Oswaldo Cruz, 48:125-42, 1950.

A survey was made of the Pb poisoning risks of the different processes involved in printing: linotype section (manipulation of type and cleaning it); monotypists; stereotypists; recasters. Among the linotype workers, the average of Pb in the air about the typists was only 0.1 mg/10 m^3 of air; of those who clean the type 0.42 mg; of those with the heating vessels 8.38 mg. Exposure of monotypists not in the immediate proximity of the melting pots was 0.06 mg, of those working without disturbing the surface layer 0.37; of those who remove this layer 1.3 mg. The amount was greatest among the recasters and the limits were widest. At the entrance of the building the amount of Pb was only 0.04 mg/10 m^3 of air; at the mezzanine level where the metal fragments discharge into the large vat, 0.55 mg; if the contents are stirred and the scum removed the figure rises to 15.89 mg. Among the compositors: for those working by hand, exposure was 0.13-0.37 mg; for the monotypists only 0.01-0.05 mg. The remedies consist in better ventilation to remove fumes and dust, and in frequent examination of blood and urine of the operatives to estimate the amounts of Pb present so that those showing amounts indicative of danger (the limits of concentration are laid down) may be treated or removed to other jobs. (From Bulletin of Hygiene 26:622, 1951; 19 references)

3073 Fletcher, A. (St. Joseph Lead Co.): MEDICAL AND HEALTH PROBLEMS OF THE LEAD INDUSTRIES. Industrial Hygiene Newsletter 10:3 (June), 1950.

As president of St. Joseph Lead Co., the speaker emphasizes the importance of medical and hygienic measures in industries from the point of view of savings in compensation costs, absenteeism in terms of "dollar" cost to the company, improvement of industrial human relations, and how the latter can be improved. This can be accomplished by making comparative reports to the "boss" of reasons for each absence of 1 day or more; having a survey made for occupational disease hazards; making someone responsible for correcting unfavorable health conditions.

3074 Genot: Enquête dans les mines de pyrite belges sur les risques d'intoxication plombique. (INVESTIGATIONS OF BELGIAN PYRITES MINES AS TO RISKS OF LEAD INTOXICATION.) Médicin d'usine 12, No. 6:351-9, 1950.

The investigation did not show any risks of chronic intoxication. (From Archives des Maladies Professionelles de Médecine du Travail et de Sécurite Sociale 12:368 (Abstracts), 1951.

3075 Great Britain, Ministry of Labour and National Service: MEMORANDUM ON ELECTRIC ARC WELDING. Form 329 (Fourth edition, 1945, revision 1950) London, H. M. Stationery Office 1950, 15 pp.

In electric arc welding, done either by hand or machine, the metal to be welded is melted by the electric arc and new metal is used with it. Hazards involved include electric shock or burns, adverse effects from infrared radiation, visible light of high intensity, ultraviolet radiation, heat, and fumes from metals and fluxes. Methods of avoiding adverse effects from these are mentioned. Ventilation must be adequate to remove fumes given off during welding. Fumes are a special problem when welding is done in a small confined space, and generally, mechanical ventilation should be continued to allow a current of fresh air to be drawn across from worker towards the work. In an unventilated enclosed space when metals, electrodes, or fluxes containing Pb, or other toxic metals are used, strict precautions should be taken. (From Bulletin of Hygiene 35: 1020, 1950)

3076 Pezzeri, V. (Univ. Rome, Italy): La composizione a mano nell'industria tipografica. Note di patologia professionale e di profilassi lavorativa. (MANUAL COMPOSITION, OCCUPATIONAL DISEASES AND PREVENTION OF HAZARDS IN THE PRINTING INDUSTRY.) Rassegna di Medicina Industriale 19:101-4 (Mar.-Apr.), 1950.

While the printing industry has benefited in the last number of years from the improvements in machinery the small industries where manual composition is still carried out retains a number of hazards. Among these the principal ones are Pb and Sb. The need of careful supervision of workers and installation of proper ventilation, etc is stressed.

3077 Ross, C.R. (Dept. Pub. Health, Nova Scotia): LEAD HAZARD IN AN ENAMEL PLANT. Industrial Health Review 2:14 (Oct.), 1950

As part of a routine survey into health hazards at a plant engaged in the manufacture of bath tubs and sinks, Pb exposures were evaluated at enameling operations. The enameling process is briefly described. It was found that air concentrations of Pb ranged from 2.3-10.3 mg/10 m^3 with the average worker exposure to Pb being of the order of 5 mg/10 m^3. Analysis of urine samples from 21 workers showed that 11 were excreting >0.30 mg of Pb/l of urine. Only 4 showed <0.15 mg Pb/l. Before control measures could be instituted, one employee developed a mild case of Pb poisoning.

3078 US Public Health Service: HEALTH OF FERROUS FOUNDRYMEN IN ILLINOIS. US Public Health Service Publication No. 31, 1950, 130 pp.

Environmental studies included analyses for Pb. Only 3 samples for Pb were collected at one foundry, where patterns were made from white metal which contained ~75% Pb. Results of the analysis showed 0.06 mg Pb/m^3 of air at melting and 0.007 mg at the finishing operation, which included grinding and routing. Pb exposures in the ferrous foundries were intermittent and rarely encountered. It was concluded that Pb does not constitute a significant hazard in this industry group.

3079 Van Arsdell, P.M. (Benson and Associates, Chicago, Ill.): LIFE AND DEATH IN AN OIL REFINERY. Parts 1-7. Petroleum Engineer 21, No. 6:C26-34, No. 8:C30-4; No. 9:C16-8; No. 10:C16-9, No. 12:C17-20, 1949; 22, No. 1:C17-20, No. 2:C19-24, 1950.

Hazards in oil refineries are reviewed. Toxicological properties of hydrocarbons, H_2S, cracking-catalyst constituents, HF, $CuCl_2$, PbO, ethanolamines, tannin, phenols, NaOH, MeOH, K_3PO_4, H_2SO_4, Et_4Pb, $BrCH_2CH_2Br$, MeEtCO, $(ClCH_2CH_2)_2O$, SO_2, NH_3, CCl_4, and furfural are reviewed. (160 refererces)

1951

3080 Abersold, J.N., and Nelson, E.W. (Am. Smelting Ref. Co., Salt Lake City, Utah): INDUSTRIAL HYGIENE AT AMERICAN SMELTING AND REFINING COMPANY. Journal of Metals 189:33-6 (Jan.), 1951.

The Department of Hygiene organized in 1945 and its function (responsibility for coordinating and maintaining a program for the good health for all workers employed) are described. Various plant improvements have been installed and these are discussed individually for the different operational divisions such as the mills, sampling room, Dwight-Lloyd sinter plants, Pb blast furnaces, reverberatory furnaces, kettles, flues, etc.

3081 Anonymous: BATTERY MANUFACTURING PLANT. Industrial Health Monthly 11:148-9 (Oct.), 1951.

Following a report received by the Louisville-Jefferson County Health Department that 2 workmen from a Pb storage battery plant were hospitalized with positive symptoms of Pb poisoning, a survey of this plant was made by the Division. As a part of the survey, a detailed appraisal was made of the status of fume, dust, and vapor control. It was recommended that all operations evolving Pb fumes and dusts be hooded and mechanically exhausted.

The potential exposures in the pasting department are sulfuric acid and Pb dust, and Pb fumes in the group-burning department. In the pasting department, the pasting machines and ovens are enclosed by hoods and the air exhausted. In the group-burning department, slot hoods are located directly behind the operation. Previous to the installation of these and other control measures in this plant, the concentration of Pb in the atmosphere exceeded the MAC many times. In subsequent determinations, the levels were within the acceptable limits.

Recommendations were also made that the plant initiate a clean-up and sanitation program. Warning posters provided by this Division informed the workmen of the hazard and nature of Pb poisoning. The utmost in cooperation was obtained from the plant management. The morale of workers in this plant has increased, and several of them have expressed a pride in working for a company which has taken positive steps to protect their health and provide pleasant, on-the-job conditions.

The Division offers free laboratory services to industries such as the one cited above. Many Pb analyses are run each month on blood and urine specimens submitted by workmen who may have been exposed to Pb.

3082 Anonymous: VENTILATION CHANGES IN LEAD-ZINC MINE IN IDAHO EFFECT BETTER HEALTH. Industrial Health Monthly 11:183 (Dec.), 1951.

Extensive recommendations to improve the working environment in a Pb-Zn mine in Idaho were completely carried out by management to assure the best health protection possible for miners, according to a report made by Idaho's industrial hygiene engineers. During a 3-day survey of the mine, the 2 engineers reported the need for more ventilation, which was obtained in this mine by natural draft. Extra air doors were necessary to permit sufficient and proper circulation through the shafts and in the working levels.

Excessive dust exposures of the underground workers were due not only to inadequate ventilation but also to such practices as dry collaring of holes and to the use of insufficient water spraying.

This study was one of many made in an attempt to control conditions that are crippling the lungs of miners.

3083 Anonymous: STORAGE BATTERY PLANT USES PERIODIC CHECK ON OPERATIONS AND PERSONNEL TO GUARD AGAINST LEAD POISONING. Industrial Health Monthly 11:194-5 (Dec.), 1951.

A new storage battery plant in a Virginia town which began operation in 1949 and employs ∼60 persons has requested the Bureau of Industrial Hygiene of the Virginia State Department of Health to check periodically against Pb poisoning hazards. The medical program and control measures in effect are similar to those in other plants owned by this company. The various hazardous situations which had been revealed in the course of the surveys are described. In spite of some inadequacies in procedures and ventilation there had been no lost time cases of Pb poisoning in the 2 yr of operation, the probable reasons being careful observation for symptoms and stippled cells by both the doctor and nurse; shifting of operators if stippled cells appear; and the wearing of respirators at certain operations.

3084 Anonymous: SMALL POTTERY PLANT REBUILDS TO ELIMINATE LEAD HAZARD TO WORKERS. Industrial Health Monthly 11:195-6 (Dec.), 1951.

An occupational disease report prompted Los Angeles City's Division of Industrial Health to make a study in a small pottery plant. Each operation, from the handling of raw material to firing the figurines, was studied for potential hazards to the 26 workers employed at the plant.

The highest Pb hazards were shown to be in the following operations: in the glaze laboratory where the Pb content of the air was nearly 6 times the MAC; spray staining which showed near MAC in the workers' breathing zone and in glaze dipping where air samples showed 0.16 mg Pb/m^3 of air. The plant owner erected a new structure to house the hazardous operations. Various control measures were instituted.

3085 Anonymous: HOT METALS, PITCH, LEAD FUMES AND MACHINES ARE TOP HAZARDS TO WORKERS IN BATTERY FACTORIES. New York State Department of Labor Industrial Bulletin - Monthly News Magazine 30, No. 8:22, 1951.

The manufacture of electrical dry and wet storage batteries present certain specific hazards to the safety and health of production workers and have attracted the close attention of the New York State Department of Labor. In 1950 the Division's pilot study covered 17 battery manufacturers in New York State employing 1304 workers. During the last 6 mo of 1949 there were 27 lost time accidents in the industry. In 1 company designated Y, located on the west side of Manhattan, which is a medium sized manufacturer of automobile batteries employing 17 workers, the Pb poisoning hazard was greater than in another company, X (Brooklyn) 28 workers, since the Y company casts its own plates and pastes them in addition to casting connecting posts and terminals. In the interests of production efficiency and safety, the plant has installed a casting machine in which the whole operation including pouring of the molten Pb, is fully automatic and untouched by workers' hands. These machines have all their gears and moving parts carefully guarded so that fumes will not be dangerous. In the preliminary survey, the Labor Department found that in the last 6 mo of 1949 one man in the mixing room had contracted a slight case of Pb poisoning. Further precautions were recommended.

3086 Grut, A. (Internatl. Labour Org., Geneva, Switzerland): THE WORK OF THE INTERNATIONAL LABOUR ORGANIZATION IN OCCUPATIONAL HEALTH. British Journal of Industrial Medicine 8:199-205 (Oct.), 1951.

The activities of the International Labour Organization are reviewed. The following refers to actions taken in regard to Pb poisoning:

"A Recommendation was adopted in 1919 whereby women and young persons should be excluded from various occupations involving exposure to Pb, and that where employment should be subject to certain conditions dealing, inter alia, with ventilation, cleanliness of workrooms, notification of cases of poisoning, periodical medical examination, washing facilities and special protective clothing.

The Convention on white Pb adopted by the International Labour Conference in 1921 prohibited the use of white Pb or sulphate of Pb in internal painting, making its use subject to regulations. The employment of women and young persons in any painting work of an industrial character involving the use of these pigments was prohibited.

To facilitate the ratification of the Convention, the Office, in 1927, published a comprehensive account of the medical and technical aspects of Pb poisoning and its prevention with gratifying results as to ratification. Twenty-seven countries have now ratified this Convention."

3087 Hammond, J. [illegible]: HYGIENIC STUDY OF THE PAINT DEPARTMENT AT BAYTOWN REFINERY MEDICAL DIVISION. Medical Bulletin, Standard Oil Company (N.J.) 11:211-22 (Apr.), 1951.

In a preliminary hygiene survey at the Baytown Refinery in Texas, some hazardous exposures were found. The personnel were tested for signs of Pb absorption and indications of poisoning. The urinary excretion of Pb was utilized as the chief gauge; however, a few atmospheric tests were also made. Occupational histories were obtained to determine the relationship of job classification and exposure to Pb. The results are discussed from the aspects of the importance of the problem and of the control measures needed, many of which were put into practice. They included: (1) Use of non-Pb paints for spraying when possible; (2) use of extension pipe on spray-gun when possible; (3) working up-wind and using fresh-air supplied personal protective equipment when necessary; (4) use of brushes where no other control method assures safe exposure; (5) informing men of the danger involved; (6) insistence on sanitary rules; (7) continuing work on various protecting devices; and (8) continuing urinary Pb tests to watch for exposure. Since those measures were adopted there have been no cases of Pb intoxication in the plant.

3088 Kopczyk, H.: (PROBLEMS CONNECTED WITH LEAD POISONING IN INDUSTRY.) Poznán, Towarz. Przyjaciół Nauk. Wydział Lekarski, Prace Kom. Med. Doswiad 9, No. 3, 36 pp., 1951.

It was found that air containing <1 μg Pb/m^3 did not cause Pb poisoning in the workers employed in Pb industry; however, concentrations of ≥3 μg Pb/m^3, maintained for a long period of time, were found to be harmful. The Pb content of air was measured by a method using a gasometer to absorb Pb and dithizone for determining Pb. (From Chemical Abstracts 46:11527, 1952)

3089 Meiter, E.G. (Employers Mutual Liability Insurance Co., Milwaukee, Wis.): CHEMICAL HAZARDS IN THE PRINTING AND PUBLISHING INDUSTRY. Trans. 39th Natl. Safety Congr. 23, Current Safety Topics in Printing and Publishing Inds. 3-12, 1951.

A review is given of the major chemical hazards encountered and the protective measures for their control and elimination. (From Chemical Abstracts 46:5223, 1953)

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3090 Abrams, H.K. (California State Dept. Publ. Health, Berkeley): LABOR, MANAGEMENT, AND THE OFFICIAL AGENCY - RELATIONSHIPS ILLUSTRATED BY A PLANT STUDY. American Journal of Public Health and the Nations Health 42:38-41, 1952.

A philosophy of the place of the official health agency in private industry is presented. The basic principles to be observed by a governmental industrial hygiene agency, if its work is to be successful, are as follows: 1. It has primary responsibility to safeguard the health of workers. 2. Its technical work and its policies must be unbiased. 3. It must be able to speak authoritatively regarding health hazards and the adequacy of measures for protecting the health of employees. 4. It must be able to interpret intelligently its program to labor and management and to the health professions. 5. It should endeavor so to conduct studies that not only the plant's previous methods and programs but also its own are improved thereby. The opportunity to test these principles was a request of the Bureau of Adult Health of California by the union of a large Pb smelter for medical advice on the Pb problem. The findings of the study which resulted after the conferences with the union and company representatives, the policy in reporting, the follow-up and evaluation of results are described.

The findings, as summarized, indicated inadequately controlled, large-scale materials handling and processing operations; secondary sources of settled dust contributed to a general plant contamination near 0.15 mg Pb/m^3 air (MAC), and in weighted employee exposures exceeding this figure at all operations studied. These resulted in part from inadequate maintenance of control equipment. In 20% of employees examined (108 from 542), 82% showed either excessive Pb excretion or more positive findings which were relatively mild. A direct correlation between increased Pb exposure and frequency of clinical findings was established. Recommendations included establishment of a continuously operating local engineering control program, and participation of employees in measures for their health protection, by the establishment of an employee-management health committee.

3091 Anonymous: CLEVELAND PAINT FACTORIES INSTALL VENTILATION TO PROTECT WORKERS FROM LEAD. Occupational Health 12:44 (March), 1952.

Approximately 50 paint plants were visited by the Cleveland Bureau of Industrial Hygiene to determine the amount of Pb exposure. About 28 were found to mix Pb paints routinely during the season, and a few others made several batches/mo. One plant used 1600 lb of Pb-Zn in a batch of paint several times/wk. Air samples taken in the breathing zone of the workman emptying 50-lb bags of Pb-Zn through an opening in the floor into a mixer showed >8 mg Pb/m^3. Samples taken a few minutes after this operation showed 0.56 mg. The workman was wearing a respirator which he said was more comfortable and easier to breathe through than some. His attention was called to the fact that it was worn upside down and had spaces alongside of his nose large enough to insert 2 fingers so that it was entirely ineffective and naturally would cause no resistance. The exposure of this workman would be hard to estimate because the bag-emptying operation lasted only a few minutes and the dust was heavy enough to settle rapidly so that general air dilution reduced his exposure considerably between mixing. Mixing generally occurs several times daily during the rush season, and there may be 6 mo or more when no Pb paints are mixed. Only 1 reported case of Pb poisoning due to paint mixing occurred and that resulted in the death of the workman. There undoubtedly have been many cases which have never been reported; but, on the other hand, many of the workmen in paint plants are well along in years and apparently do not complain of poor health.

After this plant installed local exhaust ventilation, air samples taken while emptying about the same quantity of Pb-tin showed 0.16 mg Pb/m^3 in the breathing zone of the workmen. The residual concentration found a few minutes later was 0. 7 mg. The reduction from 8-0.16 mg was a decided improvement. In some other plants, the exposure had been much greater and when ventilation was installed the reduction was even more dramatic.

3092 Anonymous: ENGINEERING AND MEDICAL SURVEY OF TILE PLANT INDICATES LEAD EXPOSURE. Occupational Health 12:54 (Apr.), 1952.

At the request of the California State Division of Industrial Safety and with the cooperation of management and labor, a tile plant employing ~275 men and women was surveyed for a possible Pb or silica hazard by the Industrial Hygiene Division of the Los Angeles County Health Department. The plant medical department consisted of a full-time industrial nurse and an on-call physician. There was no plant safety engineer.

In the engineering survey, only 2 of the 18 air samples were within permissible limits. The highest levels were found at the mixer loading operation; the frit furnace area was 2nd, and the spray rig area, 3rd. Medical examination showed that 6 out of 41 blood specimens drawn from employees working with Pb materials contained 0.09 or more mg Pb/100 g of whole blood. Two of them were glaze preparers, and 4 worked on the spray rig operation. Repeat blood tests were done at about monthly intervals on these individuals. Preventive and protective measures were discussed with the employees, and management offered some of them the option of working on non-Pb jobs temporarily. In 4 mo, analyses revealed the amount of Pb in blood within normal limits. Three of those whose blood showed Pb above normal limits had no signs or symptoms of Pb intoxication as manifested by the basic medical survey. Many of those within normal blood Pb limits related subjective symptoms which one might have expected in those whose blood Pb exceeded normal limits.

3093 Banik, E. (Lübeck, Germany): Das Sulfo-Bleiweissverfahren, seine technische und gewerbehygienische Bedeutung. (THE SULFO-WHITE LEAD PROCESS, ITS SIGNIFICANCE FROM THE TECHNICAL AND INDUSTRIAL HYGIENE POINT OF VIEW.) Berufsgenossensch. 1952:10.

Sulfo-white Pb is superior to the carbonate for use as a paint pigment, and the health hazards in its manufacture are far less extensive. Also, no difficulty has been encountered with neighborhood contamination. This is in spite of the fact that sulfo-white Pb has the same toxicity as the basic Pb carbonate. (From Zentralblatt für Arbeitsmedizin und Arbeitsschutz 3:127 (Abstracts), 1953)

3094 Frede, G.: Zur Frage der betriebsärztlichen Überwachung von Bleiarbeitern. (INDUSTRIAL MEDICAL SUPERVISION OF LEAD WORKERS.) Deut. Gesundheitswesen 7:953-4 (July 24), 1952.

The author describes the measures of medical supervision exercised over 95 Pb mixers and solderers, exposed to both dust and fume.

In addition to adequate ventilation, insistence on personal cleanliness, with the provision of changes of clothing, baths and mouth washes, and the wearing of masks and respirators, special medical supervision includes:

1. Systematic inspection of workrooms by the works doctor, chiefly as a control of the efficacy of ventilation. 2. Periodic estimation of the atmospheric concentration of Pb; this was consistently found to be 1.5 mg/100 m^3 air. 3. Medical examination of all workers every 6 mo. This included inspection of the mouth for "blue line"; blood examinations, especially for punctate basophilia; urine examination; blood pressure readings; weight measurements and chest examination. Since 1950 yearly estimations of Pb in blood and urine have also been made. Inspection of the mouth showed no "blue line"; there was a high incidence of loss of teeth but this could not be specifically ascribed to Pb poisoning since 82% of these workers were in the higher age-group and had suffered from nutritional inadequacy during the war years. Punctate basophilia is regarded as the most important aspect of blood examinations. The average level found in 79.5% of all cases was 500/million erythrocytes; the highest ranged from 4800-13,200. None of these subjects showed any symptoms of ill health but there was some correlation between high levels and careless habits leading to intake of Pb. The average level of Hb was 92% and of erythrocytes 4,988,000/mm^3. The author does not consider estimation of porphyrinuria a necessary factor of medical supervision, punctate basophilia being the simplest and most reliable criterion. Estimation of Pb in blood and urine was done only for differential diagnosis. The average amount of Pb in blood was 0.063 mg/100 ml, and in urine 0.114 mg/24-hr specimen, compared with the recognized "critical levels" of 0.06 mg for blood and 0.1 mg for urine. Blood pressure estimations gave no indication of a raised level in these workers, rather there was a tendency to hypotonia, which the author is inclined to associate with a low protein wartime diet. 4. Periodical short medical report on general health risks and protective measures. The author concludes that the simplest and most reliable measures of medical supervision is the estimation of punctate basophilia, Hb level and total number of erythrocytes. (From Bulletin of Hygiene 28:193, 1953)

3095 Kovache, A., and Thibon, H.: (A CAUSE OF FIRE IN THE MANUFACTURE OF TOLITE. ACTION OF LEAD, ALUMINUM, AND IRON ORE ON TRINITROTOLUENE.) Mem. poudres 34:369-78, 1952.

Pb and Fe were found to produce explosive substances from trinitrotoluene in the presence of HNO_3 which can be ignited by heat, shock, friction, or contact with concentrated nitric and sulfuric acids. Since Al forms much less sensitive compounds its use is recommended. Metallic salts of Pb and Fe were found at the scene of explosions, lending support to the theory. (From Chemical Abstracts 49:4293, 1955).

3096 Müller, J(on) (Inst. Occup. Physiol., Pathol., Hyg., Prague, Czechoslovakia): Hospodářské ztráty způsobené olovem v akumulátorce. (ECONOMIC LOSSES CAUSED BY LEAD IN A LEAD BATTERY PLANT.) Pracovni Lékařstvi 4:18-25 (Mar.), 1952.

Economic losses caused by Pb poisoning in 1 workshop of a Pb battery plant were determined. Hygienic defects in this shop were discussed and recommendations for their removal suggested. The cost of the recommended measures was determined, and it was calculated that by carrying out hygienic measures recommended the amount of 347,552 crowns/yr could be saved in this single shop.

The duty of industrial hygienists to find and to press for the improvement of hygienic conditions in small plants where with relatively small investments, great damage to the health of workers and considerable economic losses can be prevented, is also discussed. (From author's summary)

3097 Park, W.E. (Minnesota Dept. Health, Minneapolis): RIVETERS ON RAILROAD BRIDGE EXPOSED TO LEAD FUMES. Occupational Health 12:66, 78-9 (May), 1952.

A report of Pb poisoning early in 1950 focused attention on a hot-riveting operation on a railroad bridge. The report arrived after the work was completed, so that no study could be made. When a similar operation was being performed late in 1951 in Minneapolis, a study of atmospheric Pb concentrations was made.

In order to permit movement of railroad traffic, solid steel plates were placed over the beams, and tracks were laid before the beams and cross braces were riveted. This meant that hot riveting had to be done in confined spaces ~3 x 6 x 3 ft, which were open only at the bottom. The steel was covered by an orange-colored Pb-containing paint. The paint burned off for ~1 in around each rivet, producing a smoke which was very irritating to the eyes and upper respiratory passages of the workmen. The men were exposed throughout an 8-hr day over a period of ~2 mo. Because of the intense cold, the workmen could wear respirators only for a short time, until they became frosted. On a very cold and somewhat windy day in December 1950, the engineers of the Division took several samples of air at the breathing level of the workmen. The average of 3 samples taken during the time the workmen were driving rivets was 6.[illegible] mg Pb/m^3 of air. The average of 3 samples taken while the men were bucking rivets was 8.2 mg/m^3. Clinical studies of the workers were not made.

This study demonstrated that a Pb exposure is possible during outdoor work when the worker's head and shoulders are confined in a small space as they were in the riveting job on the railroad bridge. To control the irritating smoke and Pb hazard, portable blowers supplying heated air were recommended.

3098 Park, W.[illegible], and Michaelsen, G.S. (Minnesota Dept. Health, Minneapolis): LEADED GASOLINE USED IN CARBON BLASTING POISONS MECHANIC. Occupational Health 12:160-1 (Oct.), 1952.

It has been assumed that Pb gasoline when it is burned in a high compression engine has then expended itself. Such is not the case. It still has the power to cause Pb poisoning.

In looking for the cause of Pb poisoning in a garage mechanic in Minneapolis, the trail led to a comparatively new process known as carbon blasting.

A study of several machines was conducted at Minneapolis jointly by the Minneapolis Health Department and the Minnesota Department of Health, Division of Industrial Health. C powder, which was caught in the filter, was found to contain ~55% Pb by weight, believed to be derived from the TEL in the gasoline consumed.

Exposure under the open hood of the car was particularly high, so that the operator bending over the engine could have considerable quantities of the C-Pb powder blown up in his face. Another operation which provided a heavy exposure was cleaning of the filter. The atmospheric Pb levels during C blasting at breathing level of the operator averaged from 1.0-10.2 mg/m^3 of air, the general atmosphere 2-5 ft from the car averaged from 0.06-0.35 mg/m^3, and at breathing level of operator while cleaning filter ranged from 1.9-41.0. In some instances, workmen became further exposed to the C-Pb dust by eating and smoking without washing. Usually the operators' hands were heavily coated by the black powder.

In the 1 case of Pb poisoning attributed to this type of exposure, the employee worked at C blasting continuously for 3 wk, cleaning the engines of ~3 cars/day or an average of 15 cars/wk. When he was seen by his personal physician, he exhibited the usual symptoms of acute Pb poisoning and his urinary Pb concentration was found to be 0.39 mg/l of urine. Changes in the design have been suggested which should make the machine reasonably safe under ordinary operating conditions.

Garages are being advised to require their operators to wear respirators approved for protection against Pb dusts so long as they are using the present C blasting machines. They are also urged to discontinue use of the present machine as soon as a machine is available which eliminates the hazard of Pb poisoning. Operators are warned to wash well before eating or smoking. Further studies are being conducted to evaluate the Pb hazard associated with other methods currently being used for removing C from automotive and aircraft engines.

3099 Sabnis, C.V. (All-India Inst. Hyg. & Public Health, Calcutta): EVALUATION OF LEAD HAZARD IN A PIGMENT MANUFACTURING CONCERN. Indian Journal of Medical Research 40:53-61 (Jan.), 1952.

The factory concerned is a small-sized firm in Calcutta with a total labor force of ~40 workers, supplying raw material to local Pb paint and pigment manufacturers and specializing exclusively in the production of litharge and red Pb. No openings in the factory shed or any protective measures such as exhaust ventilation exist for the minimization or elimination of Pb dust. Cleaning methods are primitive and the only protection of the workers are pieces of cloth covering their mouths and noses while at work.

Air samples were collected with the standard Midget Impinger (USA). A known volume of air at the breathing level of the worker was aspirated through 6N nitric acid and analyzed for Pb. Eight-hour urine samples were collected from various workers at a remote point outside the factory to prevent the samples from becoming contaminated with Pb dust. Blood examinations of the workers could not be performed for various reasons.

The Pb concentration per 10 m^3 of air was found to vary from 116 mg/10 m^3 at the lowest to a maximum of 3707 mg/10 m^3. The Pb content in the urine of all the workers examined ranged from 0.20-13.04 mg/l urine. These values were consistently above the level generally accepted for normal individuals not exposed to Pb. However, these high values were not considered necessarily to warrant a presumption of Pb poisoning since the exact figure at which the rise in urinary Pb excretion indicates intoxication has not yet been definitely established. None of the workers studied during the 3-wk clinical examination showed any signs or symptoms of Pb poisoning. Turnover among the employees was high, few continuing at their jobs for >6 mo, and even these short periods were interrupted by much absenteeism which may explain the fact that serious cases of Pb intoxication had not occurred during the short span of employment. Later occurrence of any illness would not be likely to be associated with Pb exposure by the uninformed workers nor would any steps be taken to apply for compensation.

Thus, without a carefully planned social follow-up, the damage done to the health of the workers by their 6-12 mo period of employment was difficult to assess. Urine excretion was strikingly lower in winter than in summer in these workers during 8-hr collection periods (6 AM-2 PM) in the winter of 1950-51. The commonest complaints of the workers, new or old, were loss of appetite, constipation, occasional headaches and bad taste in the mouth. Those working for longer periods also mentioned severe stomach pain and gradually increasing weakness. Some of them complained of pain in joints and muscles, a characteristic of Pb arthralgia.

3100 Spolyar, L.W. (Indianapolis, Ind.): WORKER USING CARBON BLASTING MACHINE TO CLEAN AUTO ENGINES EXPOSED TO LEAD DUST. Occupational Health 12:200 (Dec.), 1952.

An Indianapolis physician thought that 1 of his patients developed Pb poisoning while cleaning automobile engines with a C-blasting machine. This machine used ground walnut shells as the abrasive, feeding the shells into the motor by a blast of air at 40-60 lb/in^2 pressure. It had been shown that the C deposits in the motor become contaminated with Pb when Pb-gasoline is used. Dust collected by the physician contained 45% Pb. Urinary Pb determined 5 wk after the exposure, showed 0.262 mg of Pb/l. With this clinical background, the Division of Industrial Hygiene undertook some atmospheric Pb studies in the garage where the patient worked. The manufacturer of the blasting machine, who was present during the study, stated that similar studies had been done by the Division of Industrial Hygiene, Minnesota Department of Health, on June 4. Studies by the author's Division on Sept 3, 1952, substantiated the Minnesota findings. Following the latter, the manufacturer redesigned the machine by adding a screw type nozzle to the cylinder head and installing an additional bag collector in the machine. The old machines used a rubber stopper on the cylinder head. The results of the author's atmospheric studies were as follows:

1. New machine, nozzle plug screwed into cylinder head, 2 filter bags and operated at 45 lb/in^2 (in mg/m^3: breathing zone of operator under hood 0.136; under unit at air exhaust 0.820; general atmosphere near unit 0.175. 2. Old machine (where patient worked): breathing zone of operator under hood 2.39; under unit at air exhaust 7.55; general atmosphere near unit 0.121. 3. Same as test 2 except deflector ring was in machine: breathing zone of operator under hood 0.252; under unit at air exhaust 3.140; general atmosphere near lid of unit 1.078. 4. Another old machine but a little later model: breathing zone of operator under hood 1.37; under unit at air exhaust 1.44; general atmosphere near unit 0.174.

Until these machines are so designed as to eliminate the Pb hazard, all routine personal protective measures must be used. Every garage in Indiana was informed of the Pb hazard present and what controls are necessary.

3101 Syavtsillo, S.V., and Danilina, A.F. (USSR): Degazatsiya drevesiny, zarazhennoi etilovoi zhidkost'yu (tetraetilsvintsom). (DECONTAMINATION OF WOOD CONTAMINATED WITH ETHYL FLUID (TETRAETHYLLEAD).) Gigiena i Sanitariya 1952, No. 9:24-6.

Pine lumber treated with TEL was not decontaminated by 8 surface applications of chlorinated lime during 60 hr. Dichloramine-T was effective to the depth of 0.5 cm with TEL concentrations up to 0.05 g/cm^2 of the lumber surface; usually a 4-hr treatment with 10% solution was satisfactory, followed by 2-6 further washings. Deeper penetration and heavier contamination could be removed even in 13 hr. SO_2Cl_2 (15% solution in $ClCH_2CH_2Cl$) was rapidly active for mild contaminations and effective even for deep contaminations after 60-hr exposure, but the wood lost its mechanical strength after such treatment. A 5% solution of Cl_2 in $ClCH_2CH_2$-Cl gave rather good results in 2-6-hr treatment, but the results were not appreciably better than those of other methods. Wood contaminated to a depth of 0.6-3.0 cm could be satisfactorily decontaminated.

3102 Troisi, F.M. (Med. Factory Inspector): Prevenzione igienica nelle fabbriche di accumulatori in piombo. (HYGIENIC CONTROL OF THE FABRICATION OF LEAD STORAGE BATTERIES.) Rassegna di Medicina Industriale 21:49-61 (Jan.-Feb.), 1952.

This is a detailed account of the industrial health aspects of this industry which in Italy has not been mechanized or organized on mass production lines. There are 30 factories, mostly in the North. A minority employ >100 men, the labor strength of most of the others varying between 30 and 100. A few small tradesmen still manufacture batteries with the help of only 5 or 6 employees. "Hand" methods of manufacture seem to be more suitable to the local market, which demands a wide range of models to suit a variety of purposes; the hand-made article is said to last twice as long as the mass-produced equivalent.

The author has surveyed 15 representative factories employing from 5-400 men.

Troisi points out that Pb may be absorbed by the respiratory, the digestive or the cutaneous route; he thinks the first to be the most important. He lists the various jobs and processes which are entailed in this manufacture and points out the health hazard presented at each stage. He discusses appropriate preventive measures including personal hygiene, regular washing down of benches, floors, etc, and exhaust ventilation at the point where fumes, vapors or dusts are produced. He stresses that exhaust arrangements should be by downward draught, and that fumes, etc, should be prevented as far as possible from reaching the level of the atmosphere which is in the vicinity of the operator's mouth and nostrils. He discusses medical examination on admission, the conditions for which employment for this occupation should be advised against, and periodical medical examination of those at work. The treatment of those who show evidence of absorption and the use of milk and of Ca are discussed. (32 references)

3103 Weber, H.J. (Am. Brake Shoe Co., Chicago, Ill.): VENTILATION AT NON-FERROUS MELTING AND POURING OPERATIONS. American Foundryman 21:125-31 (Apr.), 1952.

Some reasons why ventilation of furnace and pouring operations is essential are presented. These are based on experiences with litigation cases, with occupational disease such as Pb poisoning, and with labor relations. A typical case is presented of a man who died of uremic poisoning, diagnosed by the family physician as Pb poisoning because the man worked in a brass foundry. The company lost this case and had to pay compensation. The incidence of Pb poisoning as found in a 5-yr study depended on chemical composition and particle size in melting and pouring operations. For instance, in the machine shop where Pb dust amounted to 4.9 mg/10 m^3, 2.8% of the men suffered attacks of Pb poisoning; however, in the furnace bay, exposure to 4.95 mg caused 57% to be so affected. Costs, practical applications, and deficiencies of typical exhaust ventilation from melting and pouring operations are described and illustrated by photographs of equipment. The results obtained so far indicate that a favorable solution of the problem has been found. The examples given of methods of exhausting typical nonferrous pouring and melting operations have been found effective and practical. They are relatively cheap measured in terms of the factors pointed out previously in this paper. (From author's summary)

3104 Yakovenko, M.V. (San.-Epidemiol. Sta., Moscow, USSR): Ozdorovlenie uslovii truda pri goryachei otsinkovke zheleza. (IMPROVEMENT OF WORKING CONDITIONS IN HOT PLATING OF IRON.) Gigiena i Sanitariya 1952, No. 8:46-7.

Elimination of Pb plating on the walls of the Zn-plating baths used for hot-dip method (450") of plating led to elimination of Pb vapors from the working area. The plating process is in no way deteriorated by the change.

1953

3105 Goss, A.E., and Ross, A.M.,Jr. (Conn. State Dept. Health, Hartford; Ross & Robert Co., Stratford): EFFECTIVE CONTROL OF LEAD DUST IN THE MANUFACTURE OF VINYL PLASTICS. American Industrial Hygiene Association Quarterly 14:41-9 (Mar.) 1953; India Rubber World 127:652-6, 1953.

In a plant producing calendered and extended polyvinyl chloride film, effective control of the Pb dust hazard was accomplished with the use of a minimum of exhaust ventilation. The manufacturing operations differ in this plant from those common in the industry in that Pb compounds as well as other powdered stabilizers, colors or pigments are (1) transferred from their original containers in an exhausted enclosure and (2) either processed into non-dusty forms or (3) weighed into plastic bags and sealed before entering the factory proper. The new method for this and other manufacturing operations as well as the common practice of the manufacturing process are described and illustrated by photographs. The common method in which the atmospheric concentration of Pb exceeded the MAC value of 0.15 mg/m^3 of air necessitated the continuous wearing of an approved dust respirator. At the plant using the new method, the worker wore an air-supplied helmet during the transfer of the Pb stabilizer to the blender for a total work period of only 20-30 min/day, and on only 1 of the 3 shifts. Inhalation values of Pb in the plant were below the MAC value. The atmospheric concentrations were also below the MAC value except for the actual weighing of the Pb stabilizer, but this operation is controlled by the use of an air-supplied helmet for maximum protection of the worker. Urinary Pb concentrations (method of analysis based on the work of Reed et al, 1942), varying from 0.02-0.10 mg/l of urine, were well within the limits set for workers exposed to Pb and within or near the range for non-exposed persons.

3106 Hosey, A.D.: HEALTH HAZARDS IN MAKING MONEY. Occupational Health 13:47 (Mar.), 1953.

A request had been made for an environmental health survey at all United States mints. Preliminary surveys and studies were conducted during the period 1947-50 and a number of recommendations were made to control potentially hazardous exposures. The major potential health hazards were found to be Pb and Zn fume; acid mists and/or gases; smoke and gases from furnaces; dusts containing a variety of metals. An environmental resurvey was conducted in 1951 in all 4 mints. Most of the previous recommendations for the control of atmospheric contaminants, improved lighting, and sanitary facilities had been complied with. A number of air samples were collected at the site of each type of operation and of the general room air. Analyses of these samples showed that, in most cases, exposure of workers to fumes of Pb, Zn, Se, Te, acid mists and/or gases, and dust was well below the threshold limit values adopted by the American Conference of Governmental Industrial Hygienists in 1951.

3107 Lecocq, J., Guyotjeannin, Ch., and LeLay,

J. (Ind. Hyg. Dept., Renault Works, Billancourt, France): Au sujet du danger de saturnisme dans les travaux de soudure. (DANGER OF LEAD POISONING IN WELDING OPERATIONS.) Archives des Maladies Professionnelles de Médecine du Travail et de Sécurité Sociale 14:159-60, 1953.

A survey of electrical welding operations was made as a result of complaints from workers of irritation of upper respiratory passages, nausea, headaches from the first hours of work, even in new men. Analysis of fumes showed the presence of 600 µg Pb/m^3. The authors state that they present no clinical results, nor will they be prescribed in the future because efficient exhaust systems were installed immediately, and further air analysis showed no Pb in the ambient atmosphere.

3108 Nash, P..., and Sherwood, R.J., with the assistance of Bedford, J. (Slough Ind. Health Serv.; London School of Hyg. Trop. Med., England): AN OCCUPATIONAL HYGIENE TEAM. British Journal of Industrial Medicine 10:202-6 (July), 1953.

Some of the investigations carried out by the Occupational Hygiene Team of the Slough Industrial Health Service are described. One of these, involving Pb, was made of an operation in which a man was working up to 12 hr daily casting a Pb-Sb alloy (95% Pb, 5% Sb). He had made no complaints but it was felt that a health hazard might be present. Medical examination revealed nothing abnormal. The red cells showed no stippling. The urine contained 0.13 and 0.08 mg Pb/l on 2 occasions (below the acceptable limit of 0.2 mg/l for Pb workers). No CP was detected. Air sampling was carried out by a number of small sampling units, drawing air through filter paper at 1 l/min throughout most of the working day. Ten-minute samples were also collected by a larger unit at 3 ft^3/min. The mean concentration of Pb was found to be 0.08 mg/m^3 and that of Sb 0.87 mg/m^3. The threshold limit for Pb in the air is generally taken to be 0.15 mg/m^3 and the operation therefore appeared safe from this point of view. The probability of the safe limit being exceeded was calculated to be <0.1%. The concentration of Sb was, however, higher than the threshold limit now accepted in the United States of America of 0.5 mg/m^3, although no ill effects could be detected in the operator who had been employed in the process for 18 mo. Recommendations were made for a simple improvement in the ventilation system. Of interest was the fact that although Pb was the main hazard suspected, it was the Sb which was found to be present in undesirable amounts.

3109 Osborn, S.H., and Johnston, J.H. (Connecticut State Dept. Health, Hartford): OCCUPATIONAL HEALTH PROGRAM IN A STATE HEALTH DEPARTMENT. American Journal of Public Health and the Nations Health 43:968-73 (August), 1953.

In 1928 a separate Bureau of Industrial Hygiene was established in the Connecticut State Department of Health to centralize the work being done to preserve the health of the industrial workers through the recognition, evaluation and control of the environmental causes and sources of illness in industry. The personnel of this Bureau and procedure are described. Examples of studies and consultations are given. In all studies, efforts are made to correlate results obtained from examination of body fluids with symptoms found among workers exposed to the air-borne materials. In the investigation of Pb exposures periodic urine samples are used to great advantage in evaluating the control measures that have been established. In one plant, for instance, respirators have been provided for workers in areas where the Pb hazard is difficult to control. Periodic urinary samples obtained from these workers, together with those taken from workers in other areas of the plant, showed that certain operators provided with respirators were not wearing them during operations producing large concentrations of Pb dust in the atmosphere.

3110 Parle, F.S. (Melbourne, Australia): A LEAD HAZARD IN THE AVIATION INDUSTRY. Medical Journal of Australia 2:47-9, 1953.

The hazards arising from the deposition of Pb salts, or metallic Pb, on various parts of an aircraft engine and adjacent areas of the wing are discussed. These hazards may be considered in 2 parts: (1) during the operational life of the engine; (2) while it is being overhauled. The deposits on wings may contain 30-42% Pb. The urine of 3 cleaners thus employed contained from 0.09-0.15 mg Pb/l. In the overhauling operations, the hazard arises when Pb deposits are being removed from the various parts of the engine and from Pb fumes when portions of the exhaust system are being welded. Such deposits may contain up to 76% Pb, and consist mostly of a mixture of oxides and bromides of Pb, fused together by heat. The cleaning of the parts is done in grainblasting or sandblasting booths. The Pb content of the dust on the exterior surfaces of such booths were 0.5-1% and 0.75%, respectively. Analysis of the urine of a worker who had operated a sandblasting booth for 8 mo showed 0.12 mg Pb/l of urine. Another hazard exists during the welding of parts. A welder, who had been at this work for 6 yr, had a Pb content in his urine of 0.07 mg/l. Although no cases of Pb poisoning have been detected, it is apparent that careful supervision and care and cooperation by the employees in observing instructions are necessary.

3111 Rankin, S.L., Gerlach, L.A., and Russell, F.: MAINTAINING HYGIENE IN TETRAETHYL LEAD OPERATIONS. Wilmington, Delaware, E.I. du Pont de Nemours and Co., 1953, 39 pp.

The book was prepared by the Medical Division of the Du Pont Company especially for Industrial Physicians and Nurses in the Petroleum Industry. With the primary theme of prevention, the book is well illustrated and divided into 2 parts. Part I presents "Medical Aspects of Tetraethyl Lead and Du Pont Tetraethyl Lead Compounds," including explicit sections on: Description; use; toxicity; occupational exposure; TEL intoxication, and selection and examination of workers. Part II. "Regulations Governing the Handling and Blending of Du Pont Tetraethyl Lead Compounds" includes sections and articles based upon recommendations made by the Surgeon General's Committee in an industry-wide safety effort.

3112 Rodier, J.: Les maladies professionnelles dans les mines marocaines. (OCCUPATIONAL DISEASES IN MOROCCO MINES.) Maroc. Méd. 32:205-12 (Mar.), 1953.

The working of mineral mines in Morocco is comparatively new and the minerals have so far been found far from inhabited areas away in the deserts, where water is scarce and the heat great. At present little or nothing has been done to study the conditions of work in the mines or the diseases which are almost certainly occurring. Reliance must be placed upon research carried out in other civilized countries. This article gathers such information and points out how it should be advantageously used in Morocco. Fears are expressed about Pb poisoning in mines where Pb ores are obtained; but as the Pb occurs as galena, the insoluble Pb sulfide, the risk must be small. (Such ore usually occurs associated with a quartz matrix with a risk of silicosis.) Other hazards are discussed among which Mn seems to be the most important. The need for sanitation, preemployment medical examinations and periodic examinations during employment are also covered. (From Bulletin of Hygiene 28:1058, 1953)

3113 Schuman, M., Davis, I., and Hama, G. IMPROVED CARBON BLASTER MINIMIZES LEAD EXPOSURE. Occupational Health 13:74 (May), 1953.

The company manufacturing C blasting units has improved the equipment so as to reduce air contamination from the exhaust from the process of C blasting and eliminate as much as possible Pb poisoning hazards. Samples taken in the breathing zone of the operator showed that when a primary filter is used in connection with a secondary filter the exhaust stream content of Pb is reduced to a point considerably below the MAC of 0.15 mg/m^3. The Pb exposure to the operator was considerably reduced due to the improved nozzle design to <1/2 the MAC. It is important that the filter materials used in the unit be of the correct type.

3114 Silson, J.E. (Ind. Hyg. Serv., Nashville, Tenn.): MEDICAL CONTROL OF LEAD WORKERS. Tennessee Industrial Hygiene News 10:1-3, 11 (Jan.), 1953.

The Division of Industrial Hygiene of the New York State Department of Labor, in order to establish minimum medical controls in all plants where there is exposure to Pb have published this "Outline" of general nature. Particular stress is placed upon: (1) classification of workers (high and low exposure), (2) screening techniques (examinations, laboratory studies, and recording of results, (3) medical supervision by the plant physician (annual examinations, interim examinations, laboratory standards, and reclassification of workers), and plant control of the Pb hazard.

3115 Stern, A.C., and Horowitz, L.D.: INDUSTRIAL HYGIENE IN THE PAINT FACTORY. New York State Department of Labor Monthly Review 32:5-3 (Feb.), 1953.

Although the use of Pb in paints has decreased, it nevertheless remains the most important health hazard. Several precautionary measures for minimizing ingestion of toxic powders are presented. Since the inhalation hazard is considered more important than the ingestion hazard, the authors discuss more fully dust and vapor control in various handling and mixing operations. (This is a reprinting from Paint and Varnish Production, July 1951.)

3116 Szewczykowski, W.: O niebezpieczenstwie ołowicy w kaflarniach terenowych. (HAZARD OF LEAD POISONING IN TILE FACTORIES.) Med. Pracy (Warsaw) 4:291-2, 1953; Current List of Medical Literature 25:567, 1954.

1954

3117 Anonymous: EXHAUST HOOD FOR LEAD FUMES. Occupational Hazards 16, No. 4:18, 61, 1954. .

Tests of tempering shop atmosphere of John A. Roebling Corporation's Steel Wire Division showed that some of the Pb pans used in the rod patenting operations emitted fumes above MAC; the air of the shop elsewhere was not hazardous. Personnel physical examinations revealed no Pb poisoning although a few employees were absorbing Pb in quantities that might eventually result in poisoning. A hood was designed to provide source exhaustion over the Pb pans. A diagram of this hood which has been approved by New Jersey's Department of Labor and Industry is shown.

3118 Attwood, W.A., and Lawry, W.B.: THE FORMATION AND PREVENTION OF ATMOSPHERIC CONTAMINATION IN FACTORIES. Manchester Assoc. Eng., Trans. 1953-54, 19-64.

Detection and measurements of contaminants in the form of dust, smoke, fumes, gases, causing danger to health from silicosis, asbestosis, anthrax, Hg, Pb, and As poisoning, or from fire and explosion, are discussed at length, and equipment for prevention, (British) regulations, and ventilation are described. (17 references) (From Chemical Abstracts 51:18392, 1957)

3119 Horiuchi, K., Ida, N., Imamura, Y., Iwataki, N., and Kobayashi, H.: INDUSTRIAL LEAD POISONING. VIII. SURVEYS ON THE ACTUAL CONDITION OF LEAD INDUSTRY. 1. LEAD CONTENTS IN AIR. Igaku to Seibutsugaku (Med. and Biol.) 33:165-3, 1954.

Pb contents of the air in some 40 industrial factories which used Pb or its products were determined by the polarographic method during 5 yr. The results were given in a graph. Air from Pb refining works, and paint and storage battery plants often contained more Pb than the permissible concentration of 0.5 mg/m^3. The highest concentration detected was ~11 mg Pb/m^3. (From Chemical Abstracts 50:9652, 1956.) (The graph is also shown in an extract of above article under the title, Survey on the Actual Condition of Lead Industries. 1. Lead in Air in Work Rooms. In Contributions from the Department of Preventive Medicine and Public Health, Osaka City University Medical School, Vol 1, April 1959-March 1959, p. 33.)

3120 Ida, N., Takada, I., Imamura, Y., and Oki, Y. (Medical Supervisor, Osaka Labor Standards Bureau): STUDIES ON THE RELATION BETWEEN THE CONSTITUTION OF THE FLAME OF THE WELDING WORK AND THE LEAD CONTENT IN THE ENVIRONMENTAL AIR IN A STORAGE BATTERY INDUSTRY. Journal of Science of Labor, 30:471-4 (July), 1954. In Contributions from the Department of Preventive Medicine and Public Health, Osaka City University Medical School. Vol. 1, April 1949-March 1959, pp 32-3.

The Pb content of the air in a storage battery factory was estimated by the polarographic method with the following results: (1) Pb content of the air in a welding room showed a marked increase by the use of a larger welding flame; (2) a simple mask devised to prevent the exposure to Pb fumes and dusts reduced the Pb content of the air inside the mask by 1/2 of that outside the mask.

3121 Malcom, D. (Chloride Batteries Ltd., England): THE BEGINNINGS OF THE LEAD ACID ACCUMULATOR INDUSTRY. Transactions of the Association of Industrial Medical Officers 4:109-10, 1954.

The 3 main tests used to detect excessive Pb absorption at the author's plant, are counting of stippled cells (SC), measuring Pb in air, and estimating Pb in urine. The upper limit for the mean SC count is 1500/million red cells. It is generally agreed that an upper limit of 1.5 mg Pb/10 m^3 of air is the MAC. Spot samples of urine are collected from each worker once or twice a year and analyzed by a dithizone colorimetric method. Anything over >200 mg/l (sic, should be ug) is regarded as excessive. Where any dust is formed during the process, adequate local air extraction should be available, preferably as part of a plenum system. All workshops must be clean and tidy. Where the process permits, the floors and benches are constantly washed down and kept wet. Elsewhere, wet sawdust is used for sweeping or, in certain cases, a special type of vacuum cleaner is used, which will prevent the escape of Pb dust through the bag into the atmosphere. Where any of the tests show that excessive amounts of Pb are being absorbed, the job method may be changed, or ventilation improved. Protective clothing, proper washing facilities, and adequate washing time are all essential safeguards to the workers' health, and the regulations specify minimum standards. No smoking or eating is allowed in the workshops, under the regulations, in order to prevent the swallowing of Pb.

3122 Maloof, C.C., Bavley, H., and Boylen, G. W.: (Massachusetts Div. Occup. Hyg.): THE ENGINEERING AND MEDICAL CONTROL OF A LEAD HAZARD - A PLANT STUDY. American Industrial Hygiene Association Quarterly 15: 64-5 (March), 1954.

A plant was suddenly confronted with 3 cases of Pb poisoning among the workers because Pb was handled and used without regard to its toxicity. In the initial atmospheric survey, Pb contents in air ranged up to 5.3 mg/l; coproporphyrin (CP) in workers up to 1.65 mg/l, and stippled cells up to 0.9%. By the installation of an adequate ventilating system, rotation of workers with high urinary Pb and CP values, institution of good housekeeping program, and scrupulous follow-up of the other workers by medical screening tests, the situation was checked and progressively improved. The study again reveals the importance of urinary CP tests as an aid in the early diagnosis and prevention of Pb intoxication.

3123 Moskowitz, S., Feiner, B., Burke, W.J., and Perina, A.E.: LEAD EXPOSURES FROM OXY-ACETYLENE FLAME CLEANING AND CUTTING OF LEAD-PAINTED STEEL. New York State Department of Labor Monthly Review 33:29-31 (Aug.), 1954.

The results of laboratory tests are reported which show the effects on Pb concentration in the worker's breathing zone of long (60 in) vs short (18 in) cutting torches, removal of paint by flame cleaning before cutting and width of precleaned strip. Cutting was done horizontally on flat plates, 7-12 in long and 7/16-7/8 in thick, painted with an average concentration of 1 g/in^2 of surface using a 51.2% Pb paint. The cutting was done in a 3-sided alcove vented to a courtyard. Exposures ranged from 2.8-84.2 mg/m^3 as Pb. Results showed that breathing zone concentrations were higher for flame cleaning with the long probe than with the short probe (owing to necessity for cutter to stand almost directly over work when using the awkward long probe). The exposure to Pb fume in cutting painted steel was appreciably but still not sufficiently reduced by removing a strip of paint along the line of the cut prior to cutting or by cutting with a long-handled torch. A 2-in width flame-cleaned strip produced the lowest concentrations for subsequent flame cutting. The aggregate Pb-fume exposure from flame cleaning followed by flame cutting of the flame-cleaned strip was as great or greater than that from flame cutting of the painted surface without prior paint removal. All results showed concentrations >MAC. The approved Pb fume-type respirator did not furnish complete protection against organic vapors released from the burning of the paint. Respiratory protection should be either an air-line or combination Pb-fume and organic vapor respirator.

3124 Staufer, W. (Offenbach/Main, Germany): Die Niederschlagung von Bleidämpfen aus Bleibronzegiessereien. (DEPOSIT OF LEAD FUME FROM LEAD BRONZE FOUNDRIES.) Zentralblatt für Arbeitsmedizin und Arbeitsschutz 4:33-4 (May), 1954.

Pb bronze contains 70-77% of Cu and 20-25% of Pb, and when heated at the necessary high temperature emits Pb fumes from ovens, crucibles and furnaces. In spite of technically adequate exhaust ventilation in a foundry, sporadic cases of Pb poisoning occurred, and estimation of the Pb content of the air in the foundry showed alarmingly high levels. This was found to be due to the fact that the hot gases were condensed in the metal chimney and blown back by the wind through open windows. Prevention was achieved by the use of Polak's apparatus consisting of a short cooling tube fixed diagonally into the exhaust pipe, its lower end projecting >40 cm beyond it, and opening in the shade, the upper end above the roof in the sunlight. The hot gases passing upwards through the cooling tube are condensed by the cold outer air and the solid constituents are deposited on its wall. The deposit of Pb falling as fine dust into a metal vessel at the lower end of the exhaust tube must be removed every 4-6 wk on non-working days. It is claimed that this is a simple, cheap and effective method of preventing accumulation of Pb dust in the air of the foundry.

3125 Uytdenhoef, A.: Les risques d'intoxication saturnine dans les travaux de rivetage des pièces métalliques. (RISKS OF LEAD POISONING DURING THE RIVETING OF PIECES OF METAL). Arch. Belges Méd. Sociale, Hyg., Méd. du Travail et Méd. Légale. 12:322-36 (Oct.), 1954.

Pb poisoning affected 58 men out of 280 who were engaged in assembling metal parts of wagons by applying rivets to attach them together. The parts were first covered with paint to protect against rust, the paint containing large amounts of minium or red Pb which is oxide or binoxide of Pb. Rivets (heated to 1000°C) were placed in holes and pressure applied by pneumatic hammers or hydraulically (rivets being ~800°C at this time). When the pressure was applied the Pb paint gave off clouds of fumes containing oxides of Pb which contaminated the air of the workplace, especially the area breathed by the riveters. Air in the large halls where the work was done contained 0.086 mg Pb/m^3; that at the level of the nose and mouth of the riveters, 4.8 mg/m^3 (in excess of the permissible limit). None of the cases of poisoning was severe, severity varying directly with the length of exposure to the fumes. Other contamination, ie, handling of wet paint, eating with unwashed hands, not using respirators furnished, may also have been significant. Although improvement was obtained by better ventilation, the suggestion of using paint without Pb did not meet approval. All cases occurred within 2-3 mo, during which time the process was in action more continuously than usual. The men complained of fatigue, lumbar pains, gastric neuralgia and abdominal colic; they showed blue lines on their gums, basophilic red cells and, in those most severely exposed, reduction in red cell count which disappeared on cessation of work. One man had some polyneuritis and one some nephritis. The author expresses astonishment that the risk had not come under observation sooner. (From Bulletin of Hygiene 30:242, 1955)

1955

3126 Arkhipov, A.S., Bogatkov, P.I., Oreshkevich, I.V., and Seredinina, N.V. (Gor'ki Inst. Ind. Hyg. Occup. Dis., Ministry of Health, USSR): K voprosv uchistki ventilyatsionnogo vozdukha ot tetraetilsvintsa. (PURIFICATION OF VENTILATION AIR FROM TETRAETHYLLEAD.) Gigiena i Sanitariya 1955, No. 3:11-6. In Levine, B.S.: U.S.S.R. Literature on Air Pollution and Related Occupational Diseases. Washington, U.S. Department of Commerce, Office of Technical Services, 1960, Vol. 2, pp 17-23; also Vol. 4, pp. 209-15.

Small amounts of TEL are best removed from circulating air with a 2:5 mixture of kerosine-water at a flow rate of 0.3 m/sec. The degree of purification is 90-96%. Na hydroxide (10%), 1-3% solutions of soap as well as Cl-water, polyglycol ethers, lubricating oils, all in combination with water gave much less effective results. The results are not regarded as satisfactory for the adequate removal of TEL from the public health point of view.

3127 Horiuchi, K., and Ida, N.: STUDIES ON THE INDUSTRIAL LEAD POISONING. 3. STUDIES ON THE MAXIMUM ALLOWABLE CONCENTRATION OF LEAD IN AIR. Osaka City Medical Journal 2:57-71 (June), 1955. In Contributions from the Department of Preventive Medicine and Public Health, Osaka City University Medical School. Vol. 1, April 1949-March 1959, pp. 80-94.

Since oxides of Pb are the form in which Pb is recognized to be especially toxic, industries in Japan were selected in which such oxides are manipulated, such as storage battery plants, Pb refineries, Pb welding plants and Pb casting factories. In places selected, air samples were analyzed to determine Pb concentration in air. (Concentrations of 0.49-1.189 mg/m^3 were found.) Male employees 20-50 yr of age were selected who had been at work for at least 1 yr. Reaction to Pb was soon found to be most pronounced during early weeks and months of employment, but became fairly steady after 1 yr. These men were most carefully examined clinically, physically and by analyses of blood and excreta. (Examination included stippled cell counts, urine coproporphyrin, Pb in blood and urine, frequency of usual signs and symptoms.) Statistical study was then made to establish a correlation between concentrations of Pb found in air and clinical and laboratory results. The statistical method employed is explained and graphs are drawn showing results. Findings indicated that when Pb concentration in air is <0.05 mg/m^3, work can be carried on for a long time with practically no injurious effect. As was expected, a definite relationship was found between Pb concentration in air and clinical symptoms. However, at 0.5 mg/m^3, which has been the legal allowable limit in Japan, disabling Pb poisoning has been seen. After carefully weighing all available evidence as well as results of this study, a maximum allowable concentration of Pb in industrial air was placed at 0.05 mg/m^3.

3128 Lecocq, J., and Le Lay, J. (Inst. Soc. Ind. Med. Hyg., Paris, France): Au sujet de la prévention du saturnisme. Etude de la réalité du contact. (PREVENTION OF SATURNISM. STUDY ON THE ACTUAL CONTACT.) Proceedings of the Society of Industrial Medicine and Hygiene. Archives des Maladies Professionnelles de Médecine du Travail et de Sécurité Sociale 16, No. 4: 378-80, 1955.

In order to study the actual contact by workers with Pb the dusts arising from various Pb-containing materials in a large factory in Paris were measured as to particle size to determine what proportion would be apt to deposit within an 8-hr day on the mucous membranes, skin and clothing of workers. The Pb content of sweepings was also determined. Since clinical examination had led the authors to the conclusion that risks of absorption of Pb vary with the nature of the alloy, they chose 4 formulas for study: (1) Cu-Pb alloy with 25% Pb; (2) complex alloy with 15% Pb; (3) Cu-Sn-Sb-Pb alloy with 75% Pb; (4) soldering alloy with 75% Pb. It was found that the actual risks depend principally upon solubility of the Pb compounds handled, particle size, as well as the precautions taken. This is illustrated by 2 cases: in one, the worker's blood Pb levels amounted to 1400 µg/l and he exhibited high stipple cell counts, although no evident signs of poisoning developed. He was in the habit of smoking and eating at the work site without washing hands, disregarding regulations. The wash water at the end of the day contained 57 mg Pb. The determination of Pb retained on the hands of workers was made by treating the wash water (doubly distilled) with acetic acid for the recovery of Pb, followed by the molybdate method of analysis.

3129 Simon, I. (Inst. Pharmacotherapy, Pisa, Italy): Sulla prevenzione e sulla cura dell'avvelenamento da piombo. (PREVENTION AND TREATMENT OF LEAD POISONING.) Athena (Rome) 21, No. 4:127-32, 1955.

The prevention and treatment of acute and chronic Pb poisoning are dealt with and the mechanism of action of various drugs (albumin, bisodium phosphate, sodium sulfate, etc.) is discussed. (From Excerpta Medica, Sect. 17, 3:Abstr. No. 626, 1957)

3130 Tamori, E., and Suekane, M.: REMOVEMENT EFFECT OF LEAD IN MOUTH BY GARGLING OR RINSING FOR LEAD WORKERS. Koku Eiseigaku Zasshi 3:53-4 (Apr.), 1955. In Contributions from the Department of Preventive Medicine and Public Health, Osaka City University Medical School. Vol. I, April 1949-March 1959, p. 34.

3131 Weber, H.J. (Am. Foundrymen's Soc., Des Plaines, Ill.): METAL FUMES. American Industrial Hygiene Association Quarterly 16:38-9 (Mar.), 1955.

MAC's for a number of metal fumes in processing Be-Cu castings are discussed. The heats contain ~0.10% Pb. The fumes from melted Pb are in the form of the oxide. Based on experience with thousands of air, blood and urine samples the present MAC of 0.15 mg/m^3 is believed safe even for susceptible persons. Pb poisoning was not found with continued exposures to concentrations of 0.3 mg/m^3, but cases were experienced after a 5-yr exposure to concentrations of 0.5 mg/m^3.

1956

3132 Hock, J., Bárt, Spurný, and Cermáková (Hes-Unv., Prague, Czechoslovakia): Náse zkusenosti z pruzkumu zavodu pracujicich s olovem. (EXPERIENCES IN THE INVESTIGATION OF FACTORIES WORKING WITH LEAD.) Pracovni Lekarství (Prague) 8:106-10, 1956.

The highest admissible concentration of 0.05 µg Pb/l is consistently exceeded at all permanent workplaces where Pb is worked up. Up to a concentration of 1 µg/l, no signs of Pb poisoning were found. In the development of poisoning, absorption by respiration as well as by way of the alimentary tract play a part. Most occupational diseases occur in dusty workplaces. In evaluating the workplace, it is necessary to take into consideration not only the degree of contamination, but also the type of substance being handled, together with its chemical composition and the size of the aerosols. For a rapid orientation as to the amount of Pb actually inhaled in workplaces where a respirator is used, simultaneously collected samples of unfiltered air and of air passed through the filter used by the workers, can be used. The observance of hygiene and production regulations, the use of a cotton-wool respirator and possibly the suitable transfer of persons working with high concentrations makes it, in most cases, possible to avoid the development of Pb poisoning. A draft scheme for the evaluation of individual workplaces with Pb is elaborated together with proposals essential for the protection of workers. (From Excerpta Medica, Sect. 17, 3:Abstr. No. 628, 1957)

3133 Johnstone, R.T.: FACTS AND FALLACIES OF PLUMBISM AND WHAT TO DO ABOUT THEM. Presented at Annual Meeting Lead Industries Assoc., Apr. 24, 1956, 7 pp.

It is a fact that serious Pb intoxication in industry is rare; but it is a fallacy to believe that the incidence that does occur has no significance. Several instances are given in which large companies refused to consider the evidence of Pb poisoning in their plants and thereby sustained large losses in compensation awards. On the other hand, a number of fantastic claims about Pb poisoning were proved to be without foundation. The remedy for this situation lies in more adequate education. Occupational medicine is given little attention in most medical school curriculums. The author suggests greater use of audiovisual education in plants, medical schools, and medical meetings, as an important factor in education. (From Industrial Hygiene Digest 20:1141, 1956)

3134 Manufacturing Chemists' Association, Inc.: PROPERTIES AND ESSENTIAL INFORMATION FOR SAFE HANDLING AND USE OF LEAD OXIDES. Chemical Safety Data Sheet SD-64. Washington, D.C., 1956, 10 pp.

Properties, hazards and control, handling and storage, waste disposal, and medical management of exposure to Pb oxides (PbO and Pb_3O_4) are presented.

3135 Savićević, M., Gutesa, P., and Plavsić, P. (Ind. Hyg. Inst. Belgrade, Yugoslavia): Problem saturnizma i drugih obolena u akumulatorskim elektricnim stanicama. (LEAD POISONING AND OTHER DISEASES IN THE MANUFACTURE OF ELECTRICAL STORAGE BATTERIES.) Glasnik Higijenskog Instituta (Belgrade) 5:79-84 (Jan.-June), 1956.

A survey was made of the concentrations of Pb, AsH_3, SO_2 and CO in the air and in the blood and urine of men employed in the filling of storage batteries. The workers spent mostly 3 hr/day at filling operations and only occasionally and for short periods in adjoining workshops containing the above contaminants in excessive concentrations. (Exposure to Pb ranged with ventilation from 0-60 μg and without ventilation, 80-404 μg/m³. The MAC is 0.15 mg/m³ air.) In spite of high concentrations of Pb and excessive evaporation of acids above the tolerated values, no signs of poisoning occurred except for deterioration of teeth by the action of the acids. The Pb in the blood of 5 workers ranged from 18-50 μg%, and in urine, 40-58 μg/l; coproporphyrin in urine was 21.6-48 μg/l. The authors state that the work in these plants could be much safer if the hygienic conditions were improved, and recommend periodic medical examinations and periodic control of hygienic conditions.

3136 Sherwood, R.J., and Bedford, J. (London School Hyg. Trop. Med. and Slough Ind. Health Serv., England): A LEAD HAZARD IN BOILER CLEANING. A.M.A. Archives of Industrial Health 14:92-5 (July), 1956.

Creosote pitch (known as CTF-200), a by-product of the gas industry, is used as a liquid fuel because of economic and other reasons, and ~800,000 tons of it are used annually in Britain. The ash is small in amount but contains about 5% of Pb and some As. Boilers using this fuel are overhauled yearly, and the men who clean the combustion spaces and chambers are then exposed to massive dust concentrations. For some years the men have been required to wear Mk IV or Microfilter respirators. The work reported in this paper was undertaken in London to study the health hazards of the cleaning. In addition to chemical analysis of the deposited dust, analysis of air samples taken while work was in progress was carried out. The average concentration of Pb in the air varied from 50-200 mg/m³ which is many times as great as the limit accepted in the US as safe for continual exposure. Microscopic examinations of the particle numbers and sizes of the dust were also made. As the men who carry out the boiler cleaning are only engaged in this work for ~12 hr once every quarter, the acute risk of Pb poisoning is small, but respirators are clearly essential. Analysis of the urine of 6 men before, during and after a cleaning operation indicated a distinct, though not dangerous, Pb absorption. This pointed to imperfect control of the Pb hazard. This study led to the opinion that no industrial filter-type respirator is 100% efficient and that compressed-air respirators, regularly tested for their fit, should be introduced.

3137 Watanabe, H., Tomita, K., and Murayama H.: A SURVEY OF LEAD POISONING AMONG PRINTING WORKERS IN NEWSPAPER OFFICES. Proceedings of the 29th General Meeting of the Japanese Association of Industrial Medicine. Journal of Science of Labour (Japan) 32:269 (Apr.), 1956.

Clinical and environmental examinations were carried out in 2 newspaper offices. The Pb-in-air content (measured in μg/m³) in the working positions was estimated as follows, respectively: type casting, 19-88 and 4-6; monotype, 60-95 and 10-13; type picking, 20-36 and 174; type setting, 49-63 and ---; composing, 113 and ---; type distribution, 22-29 and ---; Pb-plate rolling, 65-436 and ---; stereotyping, 26-2334 and 60-1559.

Medical examinations of 913 workers comprising hematology, Pb in blood and urine, coproporphyrin (CP) in urine, and clinical examination were carried out. No frank Pb poisoning was found, but 94 from the 1st and 105 from the 2nd showed some Pb absorption. Absorption was more marked among those handling Pb than among those exposed to inhalation of dust or fumes. (From Occupational Safety and Health 7, No. 4:217, 1957)

1957

3138 Baumann, W.H., Smith, W., and Lauer, D.J. (Jones & Laughlin Steel Co., Pittsburgh, Pa.): ENVIRONMENTAL HEALTH STUDIES ASSOCIATED WITH LEAD-BEARING STEEL PRODUCTION. American Industrial Hygiene Association Quarterly 18:29-34 (Mar.), 1957.

Pb-bearing steel contains normally 0.15-0.35% Pb (process developed and patented in latter 1930's) properly distributed to import free machining properties. The original manufacturer studied the Pb contamination problem (Martin, 1939), and a medical evaluation was also done (Kammer, 1941). A similar process undertaken by the authors' company led to this survey of the health risks in the operations which are described.

The results showed that atmospheric concentrations ranged from 0.001-0.231 mg/m³ when ventilation control was used; the same range was found at base-line analyses before process was initiated. When adverse conditions existed, the range was from 0.01-2.59 mg/m³. A careful health inventory of all men who were engaged in any aspect of the Bessemer and open hearth operations of making Pb steel included a medical history, physical examination, routine urinalysis, serology, chest X ray, hemoglobin, stippled erythrocyte count, qualitative coproporphyrin urine determination and quantitative blood Pb and urine Pb determinations. These indicated that there has been no significant Pb absorption among the workers after <1 yr of exposure. Blood Pb levels varied between 0.02-0.05 mg/100 g of whole blood with a mean of 0.029, and urinary Pb levels ranged between 0.02-0.13 mg/l with a mean of 0.053. These data compare favorably with the industrial worker of the non-Pb trades.

3139 Halperin, H.J., and Reichenbach, G.S., Jr. (Bethlehem Steel Co., Sparrows Point, Md.): ENGINEERING AND MEDICAL CONTROL OF LEAD EXPOSURE IN PATENT ANNEALING AND GALVANIZING OF WIRE. American Industrial Hygiene Association Quarterly 18:55-8 (Mar.), 1957.

A problem arising from expansion of plant facilities which caused an exposure to Pb fumes and excessive heat in a previously satisfactorily controlled operation was detected through routine engineering and medical control programs. Atmospheric samples showed Pb to exceed the recommended value of 0.15 mg/m³ in the area adjacent to the Pb pans. The 2 major jobs there are the reelers and blockers. Urine and blood analyses showed the reelers to have higher values. Fourteen workers were examined in detail; 9 were found to suffer with anorexia, headache, joint pain, fatigue, nausea and abdominal pain.

Working conditions were improved by emphasizing unique double exhaust hoods over Pb patenting furnaces, and by the use of Al shielding to reduce the heat load. As a result, urine and blood Pb levels of employees dropped from higher than occupational levels to occupational levels, and there was an improvement in the general health of the workers along with an increase in the Hb and RBC.

3140 Jensen, R., and Jensen, H. (Lab. Toxic. Soc. Security of Bordeaux, France): Risques de saturnisme dans la décoration sur verre. Intéret des mesures de prévention. (DANGER OF LEAD POISONING IN THE DECORATION OF GLASS. PREVENTIVE MEASURES.) Archives des Maladies Professionnelles de Médecine du Travail et de Sécurité Sociale 18:673-6 (Nov.-Dec.), 1957.

Two processes used for decorative work involve high Pb hazards: in enameling, where Pb borate is used as a flux; and in "graniting" where, to obtain a rough surface, the enamel containing Pb borate is coarsely ground. In the enameling workshop of a glass factory, the Pb content in the atmosphere at different places varied from 0.08-0.15 mg/m^3; at one site it was as high as 3.5 mg/m^3. This latter one was eliminated. Another test at the operation when large pieces of glass were processed, showed Pb levels of 0.160-1.210 mg/m^3. In the "graniting" workroom Pb concentrations of 2.80-3.35 mg/m^3 of air were found. By changes in the process and ventilation this level was reduced to 0.079-0.149 mg Pb/m^3. By analyzing the filter of the respirators of 4 workmen in the 1st shop the amount of Pb which would have been inhaled, without protection, in the course of 8 hr was found to be 7.3, 4.43, 2.6 and 0.3 mg, respectively. The necessity of improvements in this industry and the possibility of using Pb-free enamel is stressed.

3141 Jones, A.H. (British Transport Comm., England): SOME LEAD HAZARDS IN THE RAILWAY INDUSTRY. Transactions of the Association of Industrial Medical Officers 7, No. 2:74-7; discussion, 77-8, 1957.

The author describes a process in a brass foundry where the man handling an alloy of Sn, Cu and 27% Pb at 1100°C, in his breathing zone was exposed to 48 mg Pb/m^3 for a short period. The process was used only for 2 mo, and no clinical or hematological evidence of Pb poisoning was found. After redesigning this apparatus the Pb concentration in air directly at the running extractor was reduced to 20-30 mg/m^3, and in its immediate vicinity the Pb level was 0.22 mg/m^3. No Pb poisoning was observed in men engaged in this work.

The German Railways consider as their prime toxic hazard the manufacture of Pb bronze particles of respirable size. Other Pb hazards are incurred in tinning processes in the hollow ware industry. In an old process white metal containing 75% Pb is used at such a low temperature that no risk from fumes is present although a certain hazard arises from dross and dust. However, before treatment with white metal the bearings are tinned with a 50% Pb-Sn mixture which produces a Pb level of 1.02 mg/m^3 in the air over the tinning pot while during the pouring of Pb into molds the Pb concentration does not exceed 0.04 mg/m^3. In another tinning process practiced in the Southern Region, considerable amounts of fumes of Zn chloride, contaminated heavily with Pb, are produced. The air over the tinning pot contained 1.8 mg Pb/m^3 on one occasion, but only 0.57 mg/m^3 during the process of wiping the joints. The author believes that Pb poisoning in these cases does not occur due to the intermittent nature of the work.

3142 Rudchenko, A.V., Belokon, A.N., Bokov, A.N., and Varfolomeeva, A.G.: (INDIVIDUAL HYGIENE AND PROTECTION OF WORKERS EMPLOYED IN THE PRODUCTION OF LEAD STORAGE BATTERIES. I.) Sbornik Trudov Kursk. Med. Inst. 1957, No. 12:33-5.

Ordinary washing did not remove Pb from the hands of the workers satisfactorily, and scrubbing with a 5% solution of acetic acid gave 10.6-77.7 mg Pb in the wash water, which amounted to 4.5-68.9% of the Pb deposition on the hands. Washing with a warm solution of soda with abrasives, followed by rinsing with a 1% solution of acetic acid is recommended. Three washings with a 3% soda solution of the oral cavity of 8-15 workers did not contain Pb. (From Referat. Zhur., Khim. 1959, Abstr. No. 75343; Chemical Abstracts 55:6731, 1961)

3143 Rudchenko, A.V., Bokov, A.N., Varfolomeeva, A.G., Belokon, A.N., Goryainova, E.F., and Danilova, V.I.: (SANITARY HYGIENIC CONDITIONS IN THE PRODUCTION OF LEAD STORAGE BATTERIES. I.) Sbornik Trudov Kursk, Med. Inst. 1957, No. 12:40-6.

Air analyses in the working areas showed 14.2-85.5 mg Pb/m^3, and the minimum concentration at any point was ≤10 mg/m^3. Temperatures ranged in summer from 13-30°, and in winter from 6-20°, and the relative humidity was 35-95% with large variations within short periods; the average rate of air movement was 0.6 m/sec. Measures to be taken for improving working conditions are discussed. (From Referat. Zhur., Khim. 1959, Abstr. No. 75342; Chemical Abstracts 55:7724, 1961)

3144 Stefanović, A.N., and Simić, V.M. (Yugoslavia): DETERMINATION OF QUARTZ CONTENT IN THE MINES OF P.R. SERBIA BY CHEMICAL AND RAPID X-RAY DIFFRACTION METHODS. In XII International Congress on Occupational Health, Helsinki, Finland, 1957, Vol. III, Proceedings, pp. 327-30.

Since Serbia is a country with numerous mines, silicosis is one of the most common occupational diseases. The quartz content in ores and dust of several metal and coal mines were determined to examine the degree of silicosis risk. In 2 Pb-Zn mines of 4 examined, the ore contained 35-42 and 2-12% quartz; there were 40.1 and 16.0% workers suffering from silicosis (number examined, 106 and 382, respectively).

3145 Viniegra, G., Lopez Martinez, A., Marquez Mayaudon, E., and Bravo Becherelle, M.A.: Epidemiologia del saturnismo en la industria de acumuladores del Distrito Federal. (THE EPIDEMIOLOGY OF SATURNISM IN THE STORAGE BATTERY INDUSTRY OF THE FEDERAL DISTRICT.) Prensa Med. Mex. 22, No. 2:50-4, 1957.

Working conditions were studied in 65 plants with 377 laborers of whom 236 were completely examined. The Pb content of the air of the working environments was also studied. The majority of the workshops did not come up to reasonable hygienic requirements, neither with regard to sanitary provisions nor in view of medical control and attendance. One third of the men showed high Pb levels of the blood (over 60 µg/100 ml), but others with lower Pb levels also presented symptoms of intoxication. Most affected were men with <1 yr service (40%). The groups of laborers most endangered were (in decreasing order): casters, molders, welders and melters. No pathognomonic picture of the Pb intoxication could be established. The dominant symptoms were the Pb line, intestinal colics, metallic taste and constipation. As regards hematology only the number of red cells was found to be diminished, more markedly in the more serious cases. (From Excerpta Medica, Sect. 17, 4:Abstr. No. 902, 1958)

3146 Zielhuis, R.L. (PAINT AND HEALTH. I, II, III.) Verfkroniek 30:178-80; 196-7, 207-11, 1957.

After some important facts are given on toxicology and the possible forms of contact, locally or generally, unnoticed or noticed, with different poisons (direct contact with skin, inhalation, effects on nose, pharynx, lungs, eyes, intestines) the toxicity is discussed, on the basis of existing literature, of different binders and their permissible concentrations, of pigments (Pb, As, Hg, Cr, Sb, Mo, Cu, Ba, Cd, Zn, Se, Sr, Ti, Co, Mn, and organic groups containing cyanide or cyanamide groups), of driers, solvents, diluents, and plasticizers based on their physical-chemical properties (prickling of skin, tearing of eyes, chronic conjunctivitis, sneezing, coughing), and on their chemical structure (narcotic, blindness, fatal attack on blood-forming organs, etc). A systematic hematological investigation is described. The work was carried out to enable dermatologists to test skin diseases by contact with the substances tested in these experiments. (From Chemical Abstracts 52:3176, 1958)

1958

3147 American Industrial Hygiene Association: HYGIENIC GUIDE SERIES. LEAD AND ITS INORGANIC COMPOUNDS. American Industrial Hygiene Association Journal 19:154-5, (Apr.), 1958.

The recommended maximum atmospheric concentration of Pb, on the basis of human experience, is listed as 0.2 mg/m^3 for 8-hr exposure. Symptoms and signs of Pb poisoning are described. It is noted that the Subcommittee on Lead of the Z37 Sectional Committee of the American Standards Association has recommended the adoption of 0.5 mg Pb/m^3 as the maximum acceptable atmosphere concentration for Pb chromate and sulfide, and 0.2 mg/m^3 for metallic Pb and other inorganic Pb compounds. The atmospheric concentration immediately hazardous to life is not known. The minimum lethal dose of a soluble salt by ingestion is ~10 g. Control procedures, both industrial and medical, are discussed. Normal Pb values for urine and blood analyses are given as follows: urine (spot sample) 0.01-0.12 mg/l; (sample of large volume) 0.01-0.08 mg/l; blood 0.01-0.06 mg/100 g. (11 references)

3148 American Petroleum Institute: API BULLETIN ON PRECAUTIONARY LABELS FOR PETROLEUM PRODUCTS. American Petroleum Institute Bulletin 2511, January, 1958. 13 pp.

The guiding principles for the wording of labels and definition of terms are given. The API Interdivisional Committee on Labeling has agreed that the following are necessary in a proper warning label: name of product, signal word, statement of hazard, precautions, first aid and/or emergency action, container handling and storage, "poison" usage, labeling of experimental products. A sample label to be used for leaded gasoline is included.

3149 American Welding Society: SAFETY IN WELDING AND CUTTING. American Standard Z49.1-1958. New York, 1958, 49 pp.

Standard provisions are given for welding and cutting, as prepared by the American Standards Association Committee under sponsorship of the American Welding Society; this is a complete revision of the 1st edition published in 1950. The following are covered: installation and operation of welding equipment, fire prevention, protection of personnel, health protection and ventilation to guard against F, Zn, Pb, Be, Hg, etc, especially in confined spaces.

3150 Guerdjikoff, C.: Etude de quelques risques de saturnisme en Suisse. (A STUDY OF SOME INDUSTRIAL LEAD HAZARDS IN SWITZERLAND.) Z. Unfallmed. u. Berufskrankh. 51, No. 2:85-122, 1958.

This report, presented at a meeting of the Swiss Society of Industrial Medicine and Accidents, is concerned only with industries of various kinds in Switzerland in which there may be a danger to health of the workers from exposure to Pb. These industries are described and an account is given of the results of investigations which have been carried out in each case but with stress on the point that every separate factory in each industry must be separately considered because of the variations in such factors as hygienic state, degree of ventilation and the human factor which may have a determining effect on the occurrence of Pb intoxication. The methods employed in air analyses are described with a statement of opinions on the permissible limits of Pb concentration in the air of factories. The processes in different industries where Pb may be a risk are considered at some length with an account of the conditions which were found on inspection of individual factories. The industries which have been studied are: the manufacture of accumulators, the building industry (protective Pb paints and demolition work), Pb smelting, manufacture of Pb-containing bronze, manufacture of polyvinyl plastics in which Pb-containing stabilizers are used, pottery work, some types of enamelling, printing, manufacture of telephone cables sheathed in Pb, and chemical and other works. Emphasis is laid on the point that accurate scientific and other investigations are essential before the best possible control and prevention of Pb poisoning can be achieved. (From Bulletin of Hygiene 34:58, 1959)

3151 Holtaway, J.S. (Am. Brake Shoe Co.): EVALUATION AND CONTROL OF LEAD EXPOSURES IN POWDER METALLURGY OPERATIONS. American Industrial Hygiene Association Journal 19:481-4 (Dec.), 1958.

A study was made in a small powder metallurgical plant in which collected air containing metallic Pb dust of extremely small particle size was recirculated. Although Pb was present in small amounts (6% maximum) in the materials used, the survey revealed excessive amounts of Pb in the returned air from unit collectors and in the atmosphere (0.06-0.90 mg/m³) as well as high levels in the urines of exposed workers. For 14 employees a urinary Pb excretion ranging from 225-471 µg/l was found. After control of the exhaust ventilation and other precautionary measures the Pb level in air was reduced to 0.04-0.15 mg/m³ and the urinary Pb excretion of the same 14 employees dropped to 25-235 µg/l.

3152 Pagnotto, L.D., and Bayley, H. (Massachusetts Dept. Labor & Ind.): THE CONTROL OF A LEAD HAZARD IN THE SILVERSMITHING INDUSTRY. American Industrial Hygiene Association Journal 19:73-4 (Apr.), 1958.

A Pb exposure hazard in a metal-burnishing operation peculiar to the silversmithing industry was investigated, following the illness of one of the workers who upon return to work was found to excrete elevated amounts of Pb and coproporphyrins (CP). The extent of contamination was found to be dependent upon the amount of sandbobbing performed. The range of Pb contamination varied from 3.2% for pumice used half a workday to 8.5% for pumice used for a week. Air analyses before ventilation showed 1.00-17.00 mg Pb/10 m³. Urine analyses of the sandbobbers for mg Pb/l and mg CP/l gave the following results: before ventilation 0.10-0.37, 0.10-[illegible]; after ventilation 0.07-0.17, 0.2-1.1.

3153 Ross, C.R., Sanderson, H.P., and Monkman, J.L.: SURVEY OF LEAD HAZARDS IN THE NEW BRUNSWICK PRINTING INDUSTRY. Occupational Health Review (Ottawa, Canada) 10, No. 1:1-4, 1958.

Sixty-six air samples from 8 printing plants were analyzed for Pb by the dithizone method. Most concentrations measured were well below the threshold limit of 2.0 mg Pb/10 m³, and only 2 exceeded it (1 during a drossing operation and the 2nd when a cooling fan disturbed settled dust on the top of a fume hood).

3154 Tietze (Lübeck, Germany): Eine neue Staubmaske: Die Halbmaske 78. (A NEW DUST MASK: THE HALF-MASK 78.) Dräger-Hefte 233:5043, 1958.

The half-mask 78 is said to be a protection against coarse dust as well as harmful fine dust which may enter the lungs. It is also useful as a protection against dangerous metal fumes, such as Pb fumes. The mask which is made from neoprene, has the properties of soft rubber and is not attacked by cleaning or disinfecting agents. Its good fit is emphasized. The mask has 2 vents for exhaling as most Dräger models have. The ring filter (742 St) consists only of the filter material without metal or synthetic parts and is therefore very cheap. The mask is available in 3 sizes. (From author's summary; Zentralblatt für Arbeitsmedizin und Arbeitsschutz 9:79 (Abstracts), 1959)

3155 Woolff, M.G. (Port Elizabeth, South Africa): NOTES ON THE CARE OF LEAD-WORKERS. South African Medical Journal 32, No. 14:368-77, 1958.

In a paper presented at the SA Medical Congress, Durban, September 1957, the author gives a survey of the industrial hazard of Pb intoxication in the growing industrialization of SA. Topics discussed are the environment of industrial workers, plant inspection, and enumeration of the SA industries using Pb, atmospheric contamination by dust and fumes and its diminution by protective measures, instruction of workers, establishment of maximum allowable limits and air sampling methods for its control. Other ways of reducing the Pb hazard in manufacture are modification of industrial operations, plant design, isolation of hazardous operations, ventilation, etc. Measures directed to the individual workman include personal protective equipment, showering and sanitary facilities, prohibition of eating in workrooms and with contaminated hands, and special safety measures in the handling of TEL. Medical considerations are sex and age of worker, examination of each worker upon resumption of employment, and individual and family susceptibility and acquired tolerance. Conditions meriting rejection for Pb work and periodic examinations of Pb workers (frequency according to UK Factory Act regulations) are given. The survey ends with a detailed description from the literature of signs and symptoms of Pb-induced disturbances such as gastrointestinal symptoms, nervous system signs, arthralgia and renal disease. Pallor and the Pb or Burton lines are signs of special significance. Absorption and excretion of Pb, effects of increased Pb exposure, or stippling of erythrocytes, white cell count, porphyrin tests, Hb estimation and general managements and disposal of cases of absorption as well as prophylactic methods are among the subjects treated in the survey.

3156 Zemskov, I.F., and Khalyavin, M.N.: (PURIFICATION OF A GASEOUS-AIR MIXTURE FROM LEAD TETRAETHYL WITH SULFURIC ACID.) Khim. Prom. 1958, no. 8:500-1.

The usual methods of gas purification are useless when dealing with TEL. The air containing various amounts of TEL fumes is passed in succession at a speed of 15-30 l/hr (time of contact 1-2 sec) through 2 Petri bottles filled with H_2SO_4 94% at 18-20° and then through 2 containers 0.5% filled with a solution of iodine in 1% KI for the catching of the TEL fumes not absorbed by the sulfuric acid. When the treated H_2SO_4 is diluted 1:1 with water a white sediment of Pb sulfate precipitates out of the solution. The degree of TEL absorption with various quantities of these fumes in the air is tabulated. The H_2SO_4 concentration should be >79.6%. The activity of H_2SO_4 as absorber of TEL fumes significantly increases with the raising of temperature to 100°. The destruction of 1 g of TEL requires 0.31 g of monohydrate. (From Chemical Abstracts 54:7020, 1960)

1959

3157 Associated Ethyl Company Limited: CLEANING LEADED GASOLINE TANKS. Octel Bulletin No. 1 (London), Sept. 1959.

Typical causes of accidents are (1) removal of breathing equipment, (2) absorption of vapor outside tank, (3) wrong materials for protective equipment and (4) unsuitable breathing equipment. Regulations concerning entry after cleaning are revised and stringent minimum conditions are set up. Breathing bags are not generally recommended, particularly not in warmer weather. Proper air extractors should be provided for ventilation. Manufacturers of tanks should be required to incorporate in their design at least one clean-out sump and existing tanks should be modified to provide such sumps.

3158 Hartogensis, F. (TNO Inst. Health, Gravenhage, Netherlands): THE EXPOSURE TO LEAD OF WORKERS IN THE PIGMENT INDUSTRY. Pracovní Lékařství 11:165 (Apr.), 1959.

On the basis of more than 250 determinations in 2 factories, the workers were divided into 4 exposure groups: (1) no exposure to Pb; (2) slight exposure, av <0.15 mg Pb/m^3; (3) high exposure, av 0.15-0.75 mg/m^3; very high exposure, av >0.75 mg/m^3.

3159 Khukhrin, E.V.: MODERN APPROACH TO AIR DUSTINESS IN WORKSHOPS. Gigiena i Sanitariya 24, No. 7:50-5, 1959. In Levine, B.S.: U.S.S.R. Literature on Air Pollution and Related Occupational Diseases. Washington, U.S. Department of Commerce, Office of Technical Services, 1962, Vol. 7, pp. 301-8.

New data on the effect of harmful air pollutant concentrations have been collected by research institutes during the last years, leading to an extension of the list of standardized harmful air admixtures, and a revision of the MAC's for air pollutants. At the Jubilee session of the Institute of Hygiene and Occupational Diseases, AMS, USSR (1953) the question was raised to change to the particle-count method, used widely abroad. Attempts, however, to compare dust counts with the morbidity rate among workers showed no clear connection. The author states that the method is so widely used abroad and stems from its simplicity rather than its reliability.

So far, no clear and uncontestable data have been presented to establish safe threshold limits of aerosol inhalation, because the methods used still lack the precision. Data obtained from the health conditions of the workers cannot be used as criteria. For toxic suspended aerosols MAC's must be arrived at experimentally without delay; however, these should be regarded as tentative, and subject to revision on the basis of further clinical observations and supplemented experiments.

It has not been possible yet to verify the necessity of establishing separate norms for maximum and mean work-day concentrations, because most methods enable the determination of average concentration only for a prolonged time lapse. Despite these limitacions, data have been accumulated and a list of 34 aerosols was presented at the 1957 symposium on pneumoconiosis in Moscow. The list published by the Scientific Medical Council of Ministry of Health USSR, contains 29 mineral and organic dusts and 26 aerosols of metals, metalloids and their compounds; for Pb and its inorganic compounds, 0.01 mg/m^3 was set as the MAC. Departure from the set values can be made with the permission of the State Sanitary Inspection where workers remain a short time only on the site. Additions to the list could be introduced within the next 3-4 yr.

Prime attention is urged for the development of methods for the study of aerosols and their property and their effect on the organism, as well as the need for more rigid limits for the density in suspended dust particles <2μ in diameter. While conducting hygienic research, the author advocates that determination of dust dispersion according to particle diameter be made mandatory. Several research methods are mentioned which should be used as more positive bases for the determination of new MAC levels.

3160 Mirnik, K. (Centr. Inst. Hyg., Zagreb, Yugoslavia): Analiza olova u atmosferi jedne tvornice akumulatora. II. (LEAD CONTENT IN THE ATMOSPHERE OF A STORAGE BATTERY FACTORY.) Arhiv za Higijenu Rada Toksikologiju 10, No. 3:235-43, 1959.

Environmental conditions in a storage battery factory are described. The results of Pb determination in air obtained in 1959 are compared with the results in 1949. In general all the results were 10-200 times above the permissible concentration limits, and compared with the results obtained in 1949 a general increase of the number of high (14-50 mg/m^3) results was established. Various improvements of working conditions are advised. (From author's summary)

3161 Storlazzi, E.D. (Ind. Hyg. Div., Boston Naval Shipyards): HYGIENE OF WELDING IN U.S. NAVAL SHIPYARDS. A.M.A. Archives of Industrial Health 19:307-11 (Mar.), 1959.

Among the various types of welding performed is that of Pb burning which is becoming more popular in shipyards with the advent of nuclear-powered ships. The Pb concentration in air during this operation is low because the temperature needed is only slightly above the melting point; in 1 study <0.01 mg Pb/m^3 air was found. The mechanic's urinary Pb level was 0.02 mg/l, his coproporphyrin (CP) was normal. Ten naval inspectors occasionally exposed to Pb burning operations had urinary Pb levels ranging from 0.02-0.08 mg/l and normal CP. A study of the hazards of welding on plates primed with red Pb primer and/or Zn chromate showed that a Pb hazard exists whenever the operation is carried out in confined spaces. Concentrations in air collected in numerous work rooms with or without ventilation ranged from 0-6.9 mg/m^3. The urinary Pb level in 30 welders or burners was 0.02-0.12 mg/l.

3162 Yamate, N.: (AIR POLLUTION BY EXHAUST GAS. II. DETERMINATION OF LEAD AND CARBON MONOXIDE INSIDE A GARAGE AND A REPAIR FACTORY IN TOKYO CITY.) Bull. Natl. Hyg. Lab. (Japan) 77:5-18, 1959.

The Pb values in 30 air samples from 3 garages were 1.3-175.5 μg/mm^3, and 17 samples from 3 repair factories contained 4.5-49.5 μg/mm^3 (sic). (From Public Health Engineering Abstracts 41:7 (Apr.), 1961)

1960

3163 Afanas'ev, V.P.: (THE RADIOACTIVITY OF AEROSOLS IN THE SYNCHROTRON ROOM OF THE UNITED INSTITUTE OF NUCLEAR STUDIES.) Kernenergie 3, No. 5:481-2, 1960.

Radioactive aerosols are formed in the room where the synchrotron is operating. The presence of ^{24}Na affects the formation of aerosols. The ^{24}Na concentration is 5 x 10^{-13} Ci/l ± 50%, and the concentration of naturally occurring active aerosols of ^{214}Pb (RaB) in the atmosphere is 10^{-13} Ci/l. (From Chemical Abstracts 62:194, 1965)

3164 Baranov, V.I., and Gorbushina, L.V.: (EXACT MEASUREMENTS OF THE CONCENTRATIONS OF RADIOISOTOPES OF LEAD AND BISMUTH IN THE AIR OF UNDERGROUND WORKINGS.) Atomnaya Energ. 9:56-7 (July), 1960.

A radiochemical method of separately determining Pb (RaB and RaD) and Bi (RaC and RaE) in aerosols collected with a special filter is suggested as a control measure in underground mining. Time variation curves plotted for RaD (E = 0.0167 Mev) and RaE β activity indicate a half life close to five days for RaE. The time variation curves for RaB (T = 26.8 min) and RaC (T = 19.7 min) obtained after filtering 400 l of air showed good half life separation and permitted an evaluation of the number of RaB and RaC atoms in the air and in the filter. (From Nuclear Science Abstracts 14:Abstr. No. 21821, 1960)

3165 Berghout, C.F. (Army Chem. Center, Md.): SPRAY PAINTING WITHOUT COMPRESSED AIR. Archives of Environmental Health 1:514-9 (Dec.), 1960.

The study was designed to indicate the health, safety, and fire hazards associated with the use of hydraulic pressure alone ("high-pressure" method) and hydraulic pressure and heating the paint to reduce the viscosity ("heat-with-pressure" method). The primary objective was to determine whether an air velocity <150 ft/min could be safely applied in the ventilation control of spray booths, the extent of the health hazard being based on the concentration in the breathing zone of mist containing Pb or Zn chromate pigment and vapor from the thinner. All spraying was done by representatives of the vendors who supplied their own painting and respiratory protective equipment. No medical records were available for them.

The following paint samples were analyzed: Rust-inhibiting enamel (Pb positive, specification prescribes pigment containing 35% Pb chromate and 17% red Pb); Zn chromate primer; synthetic thinner, and rust-inhibiting enamel used on missiles. The results showed that in vehicle spraying, Pb-bearing paint by the heat-with-pressure method produced concentrations averaging 4.4 mg/m^3 at low air velocity, av 0.5 mg/m^3 at intermediate, and av 2.5 mg/m^3 when the high-pressure method was used at intermediate air velocity, but 3.5 mg/m^3 at high air velocity. In missile container spraying, Pb-paint spraying by heat-with-pressure method gave average concentrations of 3.3 mg/m^3 at intermediate velocity, and by high-pressure method, av 2.3 mg/m^3 at low velocity. Spraying parts by heat-with-pressure method gave nil concentration at 150 fpm air velocity and 1.1 mg/m^3 at 100-110 fpm; at 72 fpm, Pb concentration was >1.1 mg/m^3. No samples were obtained for the high-pressure method. In open shop vehicle spraying, the heat-with-pressure method gave av 5.9 mg/m^3, and 3.2 mg/m^3 by the high-pressure method. Solvent vapor concentrations averaged 800 and 590 ppm by these 2 methods, respectively. In the other applications, solvent vapors were below the MAC of 500 ppm.

The author concludes that at low rates of ventilation in vehicle spraying, personnel requires protection of paint-spray respirators, and at air velocities <100-110 fpm dangerous concentrations of explosive vapors are recorded. For missile container spraying, a ventilating rate of at least 150 fpm and higher when bottom sides are sprayed is required. In open-face booths, a ventilating rate of at least 150 fpm should be maintained. Results in open shop area indicate danger from every standpoint.

3166 Brekhman, I.I., Matyukhin, V.A., and Fruentov, N.K. (Vladivostok, USSR): Resul'taty obsledovaniya zagryaznennosti svintsom kozhnykh pokrovov ruk u rabotayushchikh s etilirovannym benzinom. (RESULTS OF A STUDY OF LEAD CONTAMINATION OF THE SKIN OF THE HANDS OF WORKERS HANDLING ETHYLATED GASOLINE.) Gigiena i Sanitariya 25, No. 7:97-8, 1960. In Levine, B.S.: USSR Literature on Air Pollution and Related Occupational Diseases. Washington, US Department of Commerce, Office of Technical Services, 1962, Vol. 7, pp. 260-1.

A study was made of the Pb quantity found on the hands of automobile drivers, garage workers, auto repair shop workers, etc. The washings (done with TEL-free gasoline B-70) from workers' hands, steering wheels and car surfaces were obtained at noon and the end of the day. The results showed that 3.6% of the drivers' and 4% of other workers' hands were TEL-free; no TEL-free cases were found among the 50 workers in the aviation industry. The average amount found on drivers' hands was 0.125 mg and 0.115 on the hands of garage and repair shop workers. In the aviation workers this amounted to 0.249 mg, caused by the fact that aviation gasoline contains 2-3 times as much TEL as ordinary gas. On 89% of the steering wheels tested the amount found ranged between 0.1-0.2 mg and it was ≧0.3 mg in 11%. The same amounts were found on the outside surfaces of cars, hand-operated transmission parts and handles. Amounts of 0.4-0.5 mg were found in airplane cabins, and the washings of service personnel contained 0.3 mg TEL. Considerable amounts of TEL present on the handwashings of workers not having direct contact with TEL were also found. Contamination of hands and other parts of the body proved not to be eliminated or reduced in spite of instructions regarding personal hygiene, etc. The authors conclude that chronic TEL poisoning appears a possibility and that strict observation of instructions and education of the workers involved are the only effective protective means.

3167 Meiklejohn, A. (Univ. Glasgow, Scotland): HALIFAX, STOKE-ON-TRENT - WHITHER? Transactions of the Association of Industrial Medical Officers 9:143-4 (Jan.), 1960.
A survey was made of the pottery industry in Stoke-on-Trent between 1956 and 1958 by the Factory Inspectorate of the Ministry of Labour and National Health and a report was published in June 1959. Attention is focused on the control of Pb poisoning which has occurred progressively over the last 50 yr. However, no vital statistics of the workers nor indices of general health and of occupational and non-occupational diseases were given. The Minister referred the report to the Joint Standing Committee of the Pottery Industry for further action and recommendations. The author points out that complacency about Pb poisoning and Pb absorption in the pottery industry should be shaken by the occurrence of 2 cases listed in the Annual Report of H.M. Chief Inspector of Factories for 1958 which clearly indicates the need of an industrial health service.

3168 Mirnik, K. (Central Inst. Hyg., Zagreb, Yugoslavia): Tiskare i opasnost trovanja olovom. (LEAD POISONING HAZARD IN PRINTING PLANTS.) Arhiv za Higijenu Rada i Toksikologiju 11, No. 3:233-6, 1960.
Samples of the air were taken in 127 working places in 32 printing plants of the People's Republic of Croatia, Yugoslavia. It was found that in 22 working places Pb concentration in the air was higher than the MAC (0.15 mg/m^3). The ranges observed were from 0.15-2.0 mg/m^3. This observation is in contradiction with the general opinion that occupational Pb poisoning in printing plants is practically impossible.

3169 Pegues, W.L. (Union Carbide Chem. Co., Texas City): LEAD FUME FROM WELDING ON GALVANIZED AND ZINC-SILICATE COATED STEELS. American Industrial Hygiene Association Journal 21:252-[illegible] (June), 1960.
An investigation was made to determine whether or not welding and cutting operations on steel with inorganic coatings consisting of Zn-silicate or galvanizing could give rise to hazardous amounts of Pb and Zn fumes. The sampling took place in a pipe welding and a structural shop, both equipped with large doors and excellent ventilation. Other samples were collected in a tarpaulin enclosure to demonstrate maximum fume concentration in a confined area. Collection was on Whatman No. 42 filter papers, either 1-20 ft above welding or at breathing level in which case a polyethylene tube, 3 ft long was attached to the filter holder and inserted into the welder's hood. Pb was determined colorimetrically by an adaptation of the ACGIH method. Results showed that at the welder's breathing level such welding or cutting operations on Zn-silicate coated steel in poorly ventilated areas gave rise to fumes containing 4-75 times the MAC of Pb, and 1-14 times that of Zn. At that level, the ZnO fumes amounted to 199.4 mg/m^3 and at 1-3 ft above welding, av 119.[illegible] for electric arc welding and av 26.81 for oxyacetylene welding. The corresponding figures for Pb were 5.16, 5.63 and 1.96 mg/m^3, respectively. The same operations on galvanized steel under similar conditions produced fumes containing 2-4 times the MAC of Pb, and 3-12 times the MAC of Zn. At breathing level, electric arc welding generated 185.0 mg/m^3 ZnO and an av of 108.5 at 2-6 ft above welding and oxyacetylene welding at the latter heights av 63.72. The corresponding Pb values were 0.64, 0.52, and 0.43 mg/m^3. Clean steel showed no Pb and only 14.9 and 1.3 mg/m^3 at 2 and 20 ft above welding. When ventilation was adequate, the MAC was not greatly or consistently exceeded for either type of metal coating. Pb ranged from 0.01-0.18 mg/m^3, and ZnO, 6.63-19.81. Welding outdoors, with a 10 mi/hr breeze during sampling, with welder sitting upwind, showed no Pb when probe was held 3 in. from nose, and 0.01 and 0.06 mg/m^3 with probe in hood. The corresponding ZnO levels were 2.40, 4.22 and 13.24 mg/m^3.

The author recommends that the American Standard Z-49.1, 1958 be followed.

3170 Stöckly, A.: Gesundheitsgefahren beim Schweissen. (DANGERS TO HEALTH DURING WELDING.) Z. Präv. Med. 5:329-42 (Nov.-Dec.), 1960.
Among the health hazards for welders, poisoning by Pb vapors is listed, but the author has never observed any systemic intoxication with F or Mn in this trade. (From Excerpta Medica, Sect. 17, 7: Abstr. No. 3710, 1961)

1961

3171 Anonymous: LEAD PAINTS -- PROTECTIVE HAZARDS. Michigan's Occupational Health 7:1-7 (Fall), 1961.
The dangers involved in work with red Pb-based paints are discussed as well as some precautions like periodic medical examinations, masks, ventilation, and hand-washing facilities. In the summary the hazards of surface preparation of tanks either by manual or mechanical means are pointed out. A revised list is included of respirators approved by the US Bureau of Mines in June, 1961.

3172 Du Pont de Nemours, E.I. and Co.: REGULATIONS GOVERNING THE HANDLING AND BLENDING OF DU PONT LEAD ANTIKNOCK COMPOUNDS: AT LOCATIONS RECEIVING COMPOUNDS IN TANK CARS OR TANK TRUCKS; AT LOCATIONS RECEIVING COMPOUNDS IN DRUMS. Wilmington, Delaware, E.I. Du Pont de Nemours and Co., Inc., Jan. 1961, 11 and 13 pp.

Section 1 of the pamphlets deals with regulations applying to management, Section 2 with regulations for blenders and Section 3 contains precautions against Pb hazards in other plant activities. In an appendix MAC of Pb antiknock compounds in commercial gasolines are listed as follows: per US gallon of gasoline, ml Pb alkyl and g metallic Pb, respectively, Du Pont TEL compound motor mix, 4.0, 4.23; Du Pont TEL compound, aviation mix, 4.6, 4.86; Du Pont TML compound, motor mix, 2.05, 3.17; Du Pont tetramix antiknock compound, motor mix, 2.53, 3.17.

3173 Elovskaya, L.I. (Inst. Hyg. Lab. Occup. Dis. Acad. Med. Sci., Moscow, USSR): SOME PROBLEMS OF RADIATION HYGIENE IN THE MINING AND CONCENTRATING OF ORES CONTAINING ADMIXTURES OF NATURAL RADIOACTIVE SUBSTANCES. Labor Hygiene and Occupational Diseases No. 4:21-7 (July 18), 1961. Translation of Gigiena Truda i Professional'nye Zabolvaniya No. 4, 1961. US Office of Technical Services OTS:61-31, 528.

The report of a study of the working conditions at several mines and concentration installations of nonferrous and rare metal ores (Pb, Sn, Mo, Ta, Nb, etc) deals entirely with radioactive exposure. Special attention was paid to the composition of air contaminants, the degree of contamination of hands, overalls of the workers and various equipment surfaces. The conclusion was that external radiation had no essential significance; however, the author stresses that the possibility of the combined effect of silica, radioactive and toxic substances (Pb, Sn, Ta, Nb, etc) should be kept in mind.

3174 Hartogensis, F. (TNO Inst. Health, Gravenhage, Netherlands): THE EXPOSURE TO LEAD OF WORKERS IN THE PIGMENT INDUSTRY. Proceedings of the International Symposium on Maximum Allowable Concentrations of Toxic Substances in Industry, Prague, Czechoslovakia, April, 1959. Pure and Applied Chemistry 3, Nos. 1-2:303-6, 1961.

See Abstract No. 3158.

3175 Knop, W. (Wiesbaden, Germany): Blei als Brandstifter. (LEAD AS THE CAUSE OF FIRE.) Zentralblatt für Arbeitsmedizin und Arbeitsschutz 11:84-6 (Apr.), 1961.

In a Pb accumulator plant, the dust collecting equipment had caught fire twice without any apparent reason. Similar accidents had been reported also from other Pb plants. The conclusion was drawn that self-ignition occurs from the heat which is released when the Pb particles deposited in the filters dry out and oxidize. Various fibers are discussed as replacement for the cotton filters.

3176 Magnuson, H. (US Pub. Health Serv., Washington, D.C.): HEALTH HAZARDS OF SOME NEWER PROCESSES USED IN CONSTRUCTION. Industrial Hygiene News Report 4:1 (Feb.), 1961.

The widespread use of Cu for waterlines, gaslines and some drain lines has increased the hazard of Pb poisoning, since large quantities of Pb are melted and poured to seal joints in waste lines to solder sections of Cu pipe. The advent of gasoline-powered machines has created additional exposures to noise as well as to CO and other products of combustion.

3177 Masuya, Y., Sakamoto, K., and Kuromyo, M.: REMOVAL OF LEAD BY HANDWASHING IN A WORKSHOP. Journal of Osaka City Medical Center 10:451-4 (Dec.), 1961. In Contributions from the Department of Preventive Medicine and Public Health, Osaka City University Medical School, Vol. 2, April 1959-March 1961, pp. 45.

The effect of handwashing on the removal of Pb from the hands of Pb workers was studied with 3% acetic acid solution, ordinary soap solution and tap water. After handwashing the Pb content was estimated in each solution by a dithizone polarographic method. No significant differences were found among the 3 solutions in their ability to remove Pb. Handwashing with a brush, using any available solution, seemed to be effective in removing Pb from the hands of the workers. (From authors' English summary)

3178 Meyer, W.H., and Church, F.W. (Esso Res. Eng. Co.): INDUSTRIAL HYGIENE ASPECTS OF MECHANICAL OPERATIONS IN A PETROLEUM REFINERY. Medical Bulletin, Standard Oil Company (N.J.) 21:256-65 (July), 1961.

Exposure to Pb is included in a table which summarizes some mechanical operations, potential hazards and suggestions for their control. These are metallizing in a machine shop, babbitting, melting Sn-Pb solder in tin shop, welding and cutting.

3179 Moreo, L. (Univ. Milan, Italy): Rischio attuale di saturnismo nell'industria tipografica. (THE HAZARD OF LEAD POISONING IN THE PRINTING INDUSTRY.) Medicina del Lavoro 52:33-42 (Jan.), 1961.

A survey of 5 printing works in Milan showed that Pb concentrations in air were well below the MAC, but values in the type drawer dust were high (av 25.7-32.2 $\mu g/m^3$ in air at various operations where exhausts were operating, and 65-180 when not; in drawers, av 26.5%, and in settled dust, 1.4%). The maximum Pb amount found on the hands of some hand-compositors was 8 mg. Clinical and laboratory examinations of 100 workers showed no abnormal Pb absorption, and the case histories of 127 hospitalized workers revealed only 2 cases of mild saturnism and 5 cases of increased Pb absorption. (20 references)

3180 Raymond, V., and Gervais (Natl. Safety Inst., Paris, France): Quelques aspects de la prévention du saturnisme aux usines de la "Vieille-Montagne" de Viviez-Penchot. (SOME ASPECTS OF PREVENTION OF SATURNISM IN THE "VIEILLE-MONTAGNE" PLANTS OF VIVIEZ-PENCHOT.) Trav. et Séc. 13: 134, 1961.

The prevention of Pb intoxication in the Viviez-Penchot plants has been achieved through the adoption of industrial and personal hygienic measures.

Experiments conducted in 1956 in Pb foundries have shown that in most cases tested, chelating agents produced a decrease in Pb absorption. Certain difficulties have been encountered due to the lack of a suitable method for an easy determination of Pb absorption. (From Zentralblatt für Arbeitsmedizin und Arbeitsschutz 12:20 (Abstracts), 1962.)

3181 Savina, A.A.: (REMOVAL OF LEAD DUST FROM THE AIR OF BATTERY FACTORIES.) Sb. Nauchn. Rabot Inst. Okhrany Truda, Vses. Tsentr. Soveta Prof. Soyuzov 1961, No. 1: 16-18.
Filters remove 95% of the Pb dust in the air. The most effective cloth for the filters is kersey 4112 or 4114 which, due to the absence of nap, is well suited for retaining dust. The breaking strength of kersey is 3-4 times that of wool. Wet dust catchers, with an 85-90% degree of purification, are used in those areas in which cloth filter cannot be used due to acid or water vapor, or due to the danger of fire from sparks. (From Ref. Zh., Khim. 1962 Abstract 41540; Chemical Abstracts 57:4979, 1962)

3182 Tennessee Department of Public Health, Industrial Hygiene Service: UNHEALTHFUL WORKING CONDITIONS IN AUTOMOBILE REPAIR GARAGES. Nashville, March, 1961, 7 pp.
Studies made in several repair garages of the State have revealed numerous unhealthful conditions and practices to the attention of garage operators and indicate what means may be employed to minimize or eliminate them. In addition to hazards from CO, those from spray painting, with particular emphasis on exposure to solvent vapors and Pb are discussed. In body repair work the inhalation of toxic metal fumes or dust represents a real hazard. Caution must also be exercised in handling TEL-containing gasoline. Adequate washing and toilet facilities should be provided for the employees and their attention drawn to personal hygiene. Washing of hands should not be done with gasoline or other similar solvents.

3183 Trevethick, R.A. (Sheffield Univ., England): THE HYGIENE LABORATORY AND ITS WORK. Transactions of the Association of Industrial Medical Officers 11:74-8 (July), 1961.
A report is given on a Hygiene Laboratory recently established in England. In order to illustrate the type of work performed by this institution, 3 different investigations are described including a study on Pb exposure in the manufacture of leaded steel. The MAC value of 0.2 mg Pb/m^3 air for an 8-hr exposure, recommended by the American Conference of Government Hygienists, is used as a basis for calculating maximum concentrations for work of intermittent nature.

3184 Zemskov, I.F.: (PURIFICATION OF AIR FROM THE VAPORS OF ORGANO-LEAD COMPOUNDS.) Khim. Prom. 1961:290-1.
Equipment and technique for the purification of air containing 30-35 mg TEL vapors/m^3 (at normal temperature and pressure) is described. (From Chemical Abstracts 55:18206, 1961)

3185 Zemskov, I.F., and Khalyavin, M.N.: (THE PURIFICATION OF GAS-AIR MIXTURES FROM TETRAETHYL LEAD VAPORS BY ACTIVATED CARBON.) Khim. Prom. 1961:135-[illegible].
The degree of purification of the air containing 13 mg TEL/m^3, which was passed through activated C, AR-3 bed, was 97-98%. The absorption capacity of AR-3 was 125 mg. Repeated regeneration of AR-3 by H_2O and C_6H_6 dropped its activity after 3 cycles to 38 mg TEL/g. (From Chemical Abstracts 55:19356, 1961)

1962

3186 Anonymous: DESIGN CONSIDERATIONS FOR INDOOR FIRING RANGES. Michigan's Occupational Health 7, No. 4:1-4 (Summer), 1962.
The environmental hazard of Pb dust resulting from the use of firearms in indoor firing ranges is discussed. For the efficient control of Pb dust, a minimum ventilation rate of 50 cfm/ft^2 of open cross sectional area at the firing line is satisfactory, with a minimum acceptable rate of 20 cfm. All cleaning operations should be performed with the ventilation system in operation. For cleaning and repairing the bullet trap, the use of a respirator is recommended. Airborne Pb concentrations measured at a conventional firing range were 0.19-0.63 mg/m^3 when the ventilation was on, and 1.18-3.77 mg/m^3 when the ventilation was off. In a private basement range with no ventilation airborne Pb concentrations ranged from 0.64-1.12. The MAC for Pb, based on an 8-hr working day, is 0.15 mg/m^3. A scheme illustrating the ventilation recommended in designing indoor firing ranges is included.

3187 Katsenovich, L.A. (Uzbek Sci. Res. Inst. Sanit., Hyg. Occup. Dis., Tashkent, USSR): Rol kozhnogo pokrova kak vozmozhnogo puti proniknoveniya sernistogo svintsa v organism. (THE ROLE OF THE SKIN AS A POSSIBLE ROUTE OF PENETRATION OF LEAD SULFATE INTO THE BODY.) Gigiena Truda i Professional'nye Zabolevaniya 6:48-50 (May), 1962.
The author had observed that workers in Pb refining plants had considerable deposits of Pb sulfate dust on their skin, even though at breathing level the concentrations were within MAC levels. For this reason they undertook the analysis of the hand washwater of workers (using 1% HCl solution in 100 ml water); 979 samples were analyzed for various processes from flotation, filtration, typographic and crushing operations. The average indices of contamination ranged from 49.95 mg% for filtration down to 2.64 for crushing operations. Concentrations found at the end of the work day and arrival at work were tabulated. The results showed that the flotation, filtration and technical control operations gave rise to greatest contamination of the skin.

3188 Manufacturing Chemists' Association, Inc. (Washington, D.C.): CASE HISTORY No. 241. CHEMICAL SPILL - UPPER HALF OF EMPLOYEE'S BODY BURNED - TETRAETHYL LEAD EXPOSURE. Case Histories of Accidents in the Chemical Industry 1:58, 1962.

An operator had changed a still from secondary to regular distillation which meant that pressure would reduce from 2 psig to atmospheric. The operator had noticed a small leak and was standing on a step below a still manhole when a 6-in. inspection port cover which he was attempting to tighten blew off allowing a mixture of steam, hot water, TEL, and sludge to gush out onto him.

The manhole port cover had not been tightened properly and therefore the company decided to retrain employees in the proper method of tightening manhole port covers.

3189 Noro, L., and Laamanen, A. (Inst. Ind. Med., Helsinki, Finland): Über den Expositionsgrad einiger giftiger Stoffe in der Industrie. (THE DEGREE OF EXPOSURE TO CERTAIN TOXIC SUBSTANCES IN INDUSTRY.) Z. Präventiv-Med. 7, No. 5:366-79, 1962.

Studies made in Finland between 1956 and 1962 have shown that the degree of exposure to Pb in the ceramic industry has greatly decreased. A distinct semiannual rhythmicity is obvious, with the degree of exposure being higher in spring than in autumn. (From Excerpta Medica, Sect. 17, 9:Abstr. 2263, 1963)

3190 Parigi, A., and Coscia, G. (Univ. Turin, Italy): Aspetti della prevenzione del saturnismo fra i limatori di piombo. (PREVENTION OF LEAD INTOXICATION AMONG LEAD-FILERS.) Rassegna di Medicina Industriale 31:255-64 (May-June), 1962.

On the basis of their 9-yr experience in the medical department of a large automobile plant, the authors describe in some detail the hazards encountered in workshops during the metal-spray coating, filing and scarfing of Pb and Sn alloys. The dusts generated ranged in size from 1-5 μ, with 65% in the 1-2 μ range. In view of the conditions encountered, they recommended a number of preventive measures which included sanitary facilities, forbidding smoking and eating in the workshops, personal hygiene and protection, continuous control of atmospheric conditions, good housekeeping, medical supervision, and periodic rotation of workers at greatest risk. They illustrate the results of the preventive program by tabulating the subjective and objective symptoms in a group of 75 workers before the measures were instituted and in 70 workers over a period of 8 mo after these measures went into effect. Both groups were between 20 and 28 yr old, who had entered their jobs in good health. In the 1st group, complaints of asthenia were voiced by 70% vs by 32% of the 2nd group; diminished appetite and gastrointestinal disorders were indicated by from 28-80% vs 14-48%; nervousness by 10 vs 4%; Pb gum line was seen in 21 vs 7%; decreased erythrocytes in 61 vs 20%; basophilic stippling in 80 vs 33%; increased coproporphyrinuria in 70 vs 32%; cases who had to be removed from exposure, 60 vs 19%.

3191 Savićević, M., and Petrović, L.: Profilaksa industrijskog saturnizma. (PREVENTION OF INDUSTRIAL LEAD POISONING.) Vojnosanitetski Pregled 19:531-3 (July-Aug.), 1962.

The authors discuss the legal regulations related to Pb poisoning, mention the contraindications for work in contact with Pb, and stress the importance of medical examination before employment as well as that of periodic examinations. The measures of technical and individual protection are outlined and recommendations are set forth for the introduction of concrete measures for the prevention of contamination of the working environment by Pb. Although prophylactic treatment with Ca_2EDTA is restricted to "epidemics" of poisoning, etc, and will probably remain at this level, unless new investigations prove the contrary, the authors describe their attempt of such treatment. In closing they stress health education of the Pb exposed workers. (From authors' summary)

3192 Skonieczny, M.: Rurociągowy transport ciekłego ołowiu. (THE PIPING OF MOLTEN LEAD.) Wiadomości elektrotechniczne 30, No. 7:239, 1962.

The necessity of leak-free conduits for the piping of molten Pb is discussed and a diagram of a system of this type used in a battery factory is presented. (From Occupational Safety and Health Abstracts 1:471, 1963)

3193 Taube, P.R.: (DECONTAMINATION OF TETRAETHYL LEAD IN TRANSPORT CONTAINERS.) Gigiena Truda i Prof. Zabolevaniya 6, No. 8:53-5, 1962)

Decontamination of the residue of liquid benzene and benzene vapors from the atmosphere of transport containers was carried out in 2 stages: in the 1st one the container was washed in a 0.2% solution of Na bicarbonate and in a wetting agent DB (0.0075%) for removing the benzene residue. The concentration of TEL vapors in the atmosphere decreased but still exceeded the permissible limit for people working in this environment. In the 2nd phase, the container was rinsed with a 0.025% solution of K permanganate heated to 45-60°. (From Chemical Abstracts 57:15453, 1962)

1963

3194 American Industrial Hygiene Association. HYGIENIC GUIDE SERIES. TETRAETHYLLEAD (TEL). American Industrial Hygiene Association Journal 24:423-6 (July-Aug.), 1963.

Significant properties, hygienic standards, industrial hygiene practice and specific procedures are reviewed. The recommended MAC of TEL for 8-hr exposure is given as 0.075 mg as Pb/m^3 of air. This recommendation is based on animal studies and human experience. Signs and symptoms of effects from exposure to TEL are discussed. For exposure of a few days' duration at infrequently repeated intervals a maximum concentration of 0.15 mg as Pb/m^3 is permitted. The atmospheric concentration immediately hazardous to life is not known. A concentration of >100 mg Pb/m^3 of air for 1 hr is capable of producing illness but is not necessarily nor probably fatal. As a rough guide, urinary Pb excretion >0.1 mg/l suggests that exposure is above normal, at 0.15 mg/l the person should be moved to an area of less exposure and at 0.20 mg/l the employee should be removed from all exposure.

3195 Anonymous: APPLICATION OF RED LEAD PAINT. Michigan's Occupational Health 8:5-6 (Spring), 1963.

The Pb hazard in construction and highway work due to Pb-based paint used on structural steel is pointed out. On a routine highway bridge maintenance job involving sand blasting of the painted steel structures, the Pb content ranged from 6-116 mg/m^3 in air samples and from 117-285 millions of particles/ft^3 of air in the dust. Protective devices and education and medical supervision of the workers are discussed, together with education of the workers and encouragement of personal hygiene. Work control procedures are suggested.

3196 Anonymous: LEAD-HAZARD INVESTIGATED. Public Health Reports 78:375 (May), 1963.

When a 60-yr-old steel bridge, in Minnesota, coated many times with Pb paint, was dismantled, the structural members were cut into sections with an acetylene torch. Four air samples collected at the operator's breathing level contained 0.4-0.9 mg Pb/m^3 and 4 other samples, obtained 2-3 ft downwind from the point of cutting, 0.2-0.5 mg/m^3. Four men were occupied with cutting half time for 3 mo; one of them was hospitalized after the project was completed.

3197 Barnad, B., and Caluski, G. (Inst. Hyg. Health, Bucharest, Romania): Probleme der Arbeitshygiene und Berufspathologie in den Petroleumraffinerien. (PROBLEMS OF INDUSTRIAL HYGIENE AND OCCUPATIONAL DISEASES IN PETROLEUM REFINERIES.) Zeitschrift für die Gesamte Hygiene und ihre Grenzgebiete 4:260-4 (Apr.), 1963.

The authors show that in Romania, as in all socialist countries, non-toxic and safe working conditions were created due to the care of the state for the health of the working people, to the introduction of new technical equipment, and to mechanization, automation and the fact that production in the petroleum industry takes place in well-sealed machinery. Thus, the risk of any reappearance of professional diseases in this important field of the national economy of Romania will continue to diminish. To substantiate scientifically the complex measures covering the welfare of the working people and the control of professional diseases, the continuous reduction of morbidity involving temporary disability, and the increase of the ability to work, a number of research institutes in the field of industrial hygiene and of occupational diseases were established. In the laboratories where antiknock agents were tested, the workers were protected against Pb poisoning by wearing a mask and special rubber clothing. The precautions taken against other hazards (gasoline, olefins, Hg, sulfur dioxide, furfurol, phenols, cresols, chlorine, dermatitis) were outlined.

3198 Cerre, P., Mestre, E., and Courtault, J.: (LEAD DECONTAMINATION.) Bull. d'Information Sci. Tech. (Paris) No. 69:49-58 (Feb.), 1963.

A study was made of the methods of absolute decontamination due to the large amounts of Pb protection used in nuclear industry. Decontamination by sand blasting or by steam was replaced with a decontamination of the Pb by fusion. Decontamination by chemical methods in the laboratory was also studied. The two processes and the results obtained are described. (From Nuclear Science Abstracts 17:Abstr. No. 25486, 1963)

3199 Dodo, H. and Sagara, M. (Hiroshima Univ. School of Med., Japan): (LEAD POISONING BY THE USE OF ACETYLENE TORCH IN CUTTING PAINTED STEEL IN SHIP DISMANTLING.) Japanese Journal of Medical Progress 50:185-90 (Mar.), 1963.

The health hazard caused by the use of an acetylene torch for cutting steel plates, coated heavily and repeatedly with Pb-containing paints, is described. The heat generated by the torch liberates Pb fumes which are then inhaled by the workers. Since prolonged inhalation of these fumes will cause Pb poisoning, preventive measures of industrial hygiene should be established. (From authors' English summary)

3200 Girczys, J.: (DETERMINATION OF BASIC PROPERTIES OF LEAD DUSTS.) Rudy Metale Niezelazne 8, No. 11:447-50, 1963.

Debye unit and sedimentation analysis of dusts present in Pb factories are described. The results gave some indications as to the effect of protective masks. (From Chemical Abstracts 61: 7596, 1964)

3201 Khil'tov, N.I., and Gzulya, F.I.: THE HISTOPATHOLOGICAL CHANGES IN THE UPPER RESPIRATORY PASSAGES OF EXPERIMENTAL ANIMALS FOLLOWING ACTION BY NOXIOUS FACTORS OF A LEAD PLANT. In Trudy XXXV Itogovoi nauchnoi konferentsii. Alma-Atinskii meditsinskii institut. (Proceedings of the 35th Scientific Conference. Alma-Ata Medical Institute.) Alma-Ata, 385-90, 1963.

After a high incidence of disease of the upper respiratory passages had been found in workers of a Pb plant, the effect of Pb dust on the upper respiratory passages of animals under conditions of the factory was studied. Inflammatory infiltrates, necrosis and desquamation of the epithelium, turgor of the blood vessels and edema of the mucous membrane from the nasal cavity to the trachea were noted. (From Referativnyi Zhurnal Otd. Vypusk Farmakol. Toksikol. 1964, No. 13:54, 411; Biological Abstracts 46:Abstr. No. 71112, 1965)

3202 Machata, G., and Stenzel, E. (Inst. Forensic Med., Univ. Vienna, Austria): Luftuntersuchungen in bleiverarbeitenden Betrieben. (STUDIES OF THE ATMOSPHERE IN LEAD PROCESSING PLANTS.) Internationales Archiv für Gewerbepathologie und Gewerbehygiene 20:113-30 (May), 1963.

During the last 3 yr a greater number of Pb intoxications have been reported in Austria than in previous years; however, the intoxications were generally light. In order to propose effective prophylactic measures, the hazard presented by the atmospheric Pb concentration at various operations in the various industries must be known. The methods used to determine the Pb content in the air are described. The following concentrations (mg Pb/m^3 of air) for a daily exposure of 6-9 hr were found: battery factories 0.14-3.1; plants manufacturing Pb-containing products 0.043-0.21; foundries, etc. 0.11-0.63; dye factories (0.5-2 hr exposure) 0.15-10; enamel and glaze factories 0.17-3; plastics plants 0.40-1.06; type foundries and printing plants 0.05-0.28. In some cases, atmospheric Pb concentrations after installation of an improved ventilatory system were also given.

3203 Mircev, M. (Health Dept., Bulgaria): Le régime hygiénique-sanitaire dans l'industrie des accumulateurs en plomb. (HYGIENIC AND SANITARY MEASURES IN THE LEAD STORAGE BATTERY INDUSTRY.) In Union des Societes de Sciences Medicales, Societe d'Hygiène: Premier Congrès National d'Hygiène et de Sécurité du Travail. Rapports et Résumés des Travaux (First National Congress of Industrial Health. Abstracts of Papers). Bucharest, 1963, p. 36.

A strict surveillance has been established in Bulgaria in plants manufacturing Pb storage batteries. All work places must be furnished with efficient ventilation and the workers exposed to vapors and dust must wear masks. In all workshops where there is contact with Pb, the floors must be kept moist. Personal hygiene and good nutrition for the workers are emphasized. By observing rigorous hygienic and sanitary measures, the incidence of Pb poisoning has been markedly reduced in the last years.

3204 Nul'man, F.S., and Petrosyants, S.M. (Tashkent City San.-Epidemiol. Station, USSR): Gigienicheskoe znachenie smyvov s ruk i proizvodstvennogo oborudovaniya. (HYGIENIC IMPORTANCE OF WASHINGS FROM HANDS AND INDUSTRIAL EQUIPMENT.) Gigiena i Sanitariya 28:74-6 (July), 1963.

In addition to routine monitoring of the air of work places, the authors analyze the washings of the workers' hands and of the equipment they attend. The procedure used for the determination of Pb and Hg contamination is described. The remainder of the discussion is limited to controls in a pharmaceutical industry, the evaluation of detergents for removal of toxic substances and of protective agents.

3205 Prodan, L., and Gabor, S. (Med.-Pharmaceut. Inst., Inst. Hyg. Pub. Health, Cluj, Romania): Les principaux problèmes concernant la prophylaxie des maladies professionnelles et des accidents de travail. (THE MAIN PROBLEMS IN THE PREVENTION OF OCCUPATIONAL DISEASES AND INDUSTRIAL ACCIDENTS.) In Union des Societes de Sciences Medicales, Societe d'Hygiène: Premier Congrès National d'Hygiene et de Sécurité du Travail. Rapports et Resumes des Travaux. (First National Congress of Industrial Health. Abstracts of Papers.) Bucharest, 1963, pp. 24-5.

In their introduction, the authors state that thanks to varied and rich natural resources, the chemical industry holds an important place in the national industrial program. Large combines are presently being built where the most modern technological processes will be incorporated. In the past, the protection of workers in industries had been greatly neglected; there were no medical facilities in the plants, occupational diseases were little known, and systematic research was nonexistent. Such research was begun in 1949, assisted by the work and rich experience of Soviet scientists. Research in Romania has been oriented toward the study of the complex problems of the work environment and the study of the general occupational morbidity and industrial accidents. The health hazards in the various industries, ie, pesticides, plastics, petroleum products, etc, including those with exposure to Pb and what is being done about them, is discussed.

3206 Prodan, L., Galeriu, R., Pascou, L., Ilea, E., Ciontea, G., Ceausu, V., and Erdei, D. (Inst. for Pharmaceut. Med., Cluj, Romania): Recherches comparatives concernant les conditions de travail dans l'industrie extractive du plomb au cours des années 1950 - 1962). (COMPARATIVE STUDIES OF THE WORKING CONDITIONS IN THE LEAD-EXTRACTING INDUSTRY IN THE YEARS OF 1950 TO 1962.) In Union des Sociétés de Sciences Médicales, Societe d'Hygiene: Premier Congrès National d'Hygiène et de Securite du Travail. Rapports et Résumés des Travaux (First National Congress of Industrial Health. Abstracts of Papers). Bucharest, 1963, p. 24-5.

Working conditions in the Pb-extracting industry have been greatly improved during the last 12 yr. Compared with concentrations of Pb found in the atmosphere in 1950, an average reduction of 92.46% has been effected by 1962. In most places it is close to the maximum permissible concentration of Pb in air.

3207 Ruhf, R.C. (Bethlehem Steel Co., Johnstown, Pa.): LEAD EXPOSURE CONTROL IN THE PRODUCTION OF LEADED STEEL. American Industrial Hygiene Association Journal 24: 63-7 (Jan.-Feb.), 1963.

An engineering control program aimed to minimize the employee's exposure to atmospheric Pb during the production of leaded steel is described. Hoods constructed of 16 gauge steel are used for exhaust ventilation of Pb fumes from open top- and sunk head moulds. To determine the effectiveness of the engineering control measures, a biochemical testing program was established. All 178 workers, who might be involved in any aspect of pouring Pb-steel ingots submitted urine specimens for Pb analysis. Mean urinary levels of Pb (mg/l) were as follows for base levels; at 3 mo, 9 mo, and 15 mo of exposure with number of men shown in parentheses: (178) 0.036; (11) 0.035; (29) 0.050; (23) 0.045. The test results demonstrated that the urine levels have remained fairly stable despite a 3.[illegible] fold increase in the production of steel.

3208 Syrkina, K.E. (Munic. San.-Epidemiol. Station, Leningrad, USSR): Ob opasnosti svintsovykh otravlenii rabochikh zanyatykh na rabotakh po modernizatsii starych sudov. (THE HAZARDS OF LEAD POISONING IN

WORKERS ENGAGED IN REMODELING SHIPS.) Gigiena Truda i Professional'nye Zabolevaniya 7:50-1 (Feb.), 1963.

The operations and conditions of work in the remodeling of ships were examined. These involved demolition, removal of old paint, etc. The type of protection offered (respirators, etc) was also noted. Paint removal, metal cutting and electrical welding were accompanied by large amounts of dust containing Pb. Of 88 samples, only 13 showed no Pb; 0.01-0.12 mg Pb/cm^2 of surface dust was found. Hand washwater was also analyzed for Pb; in some operations it ranged up to 0.008 mg/cm^2 skin. Recommendations are made for improvement of working conditions.

1954

3209 American Petroleum Institute, Division of Science and Technology: PETROLEUM SAFETY DATA SHEET. New York, PSD 2202, Jan. 1964, 4 pp.

The data sheet outlines precautions for the prevention of hazardous exposure of personnel to Pb antiknock compounds while dismantling tanks that have contained Pb gasoline, and for the disposal of the steel. The 1st step, before dismantling work begins, is to clean the tank in accordance with recommended practices set forth in API Bulletin 2016 "Cleaning Tanks Used for Gasoline or Similar Low-Flash Products." The dismantling procedure, especially during cold-cutting or sandblasting operations, will dislodge accumulated scale and rust; the resulting dust can be reduced by application of water spray or fog. Precautions must be taken as leakage may have exposed the inside of the pontoons to Pb gasoline. During chipping and cold-cutting, all men within the tank should wear toxic-dust respirators. Workmen should wash hands and face before eating and shower at the end of each working day. During flame-cutting, each worker should wear a hose mask through which fresh air is supplied; sandblasters should wear sandblasters' helmets.

If the exterior of the tank has been primed or painted with Pb-base paint, flame-cutting from outside the tank requires the wearing of an approved toxic-metal-fumes respirator. If the steel is to be sold for scrap or remelting, all interior surfaces should be sandblasted or wire-brushed to bare metal. Plates and parts which have been in contact with Pb gasoline must not be reused for the manufacture of containers for edible products for either animal or human consumption. Any wood which has been saturated by Pb gasoline should be disposed of by burning but should not be burned in stoves or fireplaces of structures for human habitation.

3210 Borschke, H.: Arbeitsschutzmassnahmen in Anlagen zur Beimischung von bleihältigen Antiklopfmitteln zu Vergasertreibstoffen. (SAFETY MEASURES IN PLANTS FOR ADDING LEAD-CONTAINING ANTIKNOCK COMPOUNDS TO GASOLINE.) In Die Amtstätigkeit der Arbeitsinspektorate im Jahre 1963. Vienna, Austria, Zentral-Arbeitsinspektorat, June, 1964, pp. 69-85.

Safety measures for workers in gasoline blending plants and men engaged in the transport of antiknock compound or the cleaning of tanks and equipment for blending are discussed. (From Occupational Safety and Health Abstracts 3, No. 7:397, 1965)

3211 Castellino, N. (Univ. Naples, Italy): Prevenzione del saturnismo nella fabbricazione di accumulatori al piombo. (PREVENTION OF LEAD POISONING IN THE MANUFACTURE OF LEAD STORAGE BATTERIES. Folia Medica 47:1398-412 (Dec.), 1964.

The high incidence of Pb poisoning seen in Italy and other countries in storage battery plants is due to continual risk of exposure in all phases of work to Pb in the form of dust, fumes and vapors. For an evaluation of the actual risks involved, and of the efficiency of protective measures, the author examined the conditions in a plant manufacturing an av of 12,000 batteries/mo and employing ~80 workers. Aside from analyzing the atmospheric concentrations of Pb encountered in the various operations which are described in some detail, clinical and laboratory tests were performed on the workers exposed to Pb. The first operation described is that of fusing metallic and antimonial Pb, then casting it in molds to make the grates. With exhaust fans functioning, the atmospheric concentration of Pb was 0.67 mg/m^3 close to the molds and 0.22 at 1-m distance; the corresponding concentrations without exhaust were 0.83 and 0.54, respectively; and at a greater distance, 0.09-0.27 (av 0.13). Other operations were accompanied by concentrations of Pb as high as 2.4 mg/m^3.

The mean concentrations of Pb found in the urine of workers varied from 128-320 μg/24 hr (with a range up to 480), the highest being found in solderers of plates, followed closely by workers pouring the Pb "by hand" into molds. Coproporphyrins (CP)/24-hr urine were a mean of 102-184 μg, ranging up to 250. The 2 operations mentioned above were not adequately safeguarded, in fact soldering was done without benefit of exhaust fans. In the other 2 operations described, the potential risk was quite high; however, the urinary Pb and CP were only little higher than normal. No signs of Pb poisoning were seen in the workmen. The findings most frequently encountered involved the respiratory and gastroenteric system, with a prevalence of gastroduodenitis and subjective signs of hepatic insufficiency. These were defined by the author as ailments most often seen in the working population and not attributable to exposure to Pb.

The recommendations for controlling the hazards included the lowering of the temperature at which the metal was fused to prevent the liberation of Pb vapors; the substitution of "hand" operations by automated or semi-automated systems; adequate exhausts; personal protection and hygiene (prohibition of eating in the shops, washing hands, etc), and periodic examinations.

3212 Chakraborty, M.K., Mukherji, K.N., Bose, A.K., and Gopalakrishnan, S. (Central Mining Research Station, Dhanbad, India): AN INDUSTRIAL HYGIENE SURVEY IN A LEAD SMELTING FACTORY. Indian Journal of Industrial

Medicine 10:145-58 (Dec.), 1964.

The amounts of sulfur dioxide and Pb dust emitted from a Pb smelting factory were investigated both from an economic and health point of view. It was found that on an av ~75,000 ft^3 of SO_2 and ~2000 lb Pb as dust are thrown daily into the surrounding atmosphere. The particle size of the flue dust is very small, practically all particles are <1 μ. Within the factory, dust collected at 5 sites by MSA Midget Impinger gave Pb concentrations of 5.65-11.29 mg/m^3 air. The Pb content of fume samples collected by electrostatic sampler showed 18.71-119.6 mg/m^3 air drawn. Pb exposure of the factory workers was determined in 16 selected subjects, 28-44 yr old and employed for 6-18 yr. Urinary Pb excretion was found to vary from 0.04-0.85 mg/l, with only 4 values <0.08 (normal). The authors conclude that the dust, fume and gas problem is one that requires immediate attention. It could be substantially improved by recovery of the waste materials, and this will automatically help solve the health problem.

3213 Dzhumabaev, A. (Kirghizian Inst. of Med., Frunze, USSR): Voprosy profilaktiki pnevmokoniozov na svintsovykh rudnikakh Kirgizii. (PROBLEMS OF THE PREVENTION OF PNEUMOCONIOSIS AT LEAD MINES OF KIRGHIZIA.) Gigiena i Sanitariya 29:33-7 (Feb.), 1964.

Dust control measures instituted in the past number of years in the Kirghizia mines included wet drilling, wetting down of the rails and mounds of ore before and during loading onto dump trucks. The Pb ores, obtained from shaft and open-pit mines are beneficiated by the flotation process, requiring crushing and loading onto various conveyors and crushers before final loading into ball mills, whereupon no further dust hazard exists. For the evaluation of exposure to dusts, 5826 atmospheric samples collected at various places of the 5 mines under investigation were analyzed and the results are shown for the years 1955 through 1962. The free silica content of the dust ranged from 22.2-40.6% with the exception of 1 mine, which showed 4.5%. Particle size up to 5 μ prevailed in all. The dust content ranged from an average of 1.3-30.6 mg/m^3 air.

Investigation as to the frequency of silicosis among the Pb miners revealed that almost all cases (involving from 9.2% of the workers in 1954 down to 0 in 1962) had occurred at the mine Ak-Tyuz, operating since 1932. At the other mines that started operation since 1950, only occasional cases were encountered. It was obvious to the author that the general tendency toward a decline had begun before the survey was started. He concludes that improved working conditions had reduced average dust concentrations to levels below the maximum permissible, so that no more new cases of pneumoconiosis were observed.

In order to investigate the biologic reactivity of the dusts, white rats were injected intratracheally (without anesthesia) with ore dust containing 4.5-50% quartz and from traces to 5% Pb sulfide. The results confirmed the reactivity of the dusts on lung tissue in proportion to the free silica contained in them. At the concentrations present, Pb sulfide had no effect on the development of pneumoconiosis. (A footnote by the editor of the journal states that the data reported do not permit the assumption that concentrations of Pb sulfide of this magnitude are innocuous to the organism.)

3214 Jacobson, M., Cooper, A.R., and Nagy, J. (Bureau of Mines, Pittsburgh, Pa.): EXPLOSIBILITY OF METAL POWDERS. U.S. Bureau of Mines Report of Investigations 6516, 1964, 25 pp.

The ignition temperature of a relatively coarse dust of Pb as dust cloud or dust layer is 710 and 270°C, respectively; the index of explosibility is <0.1.

3215 Kairakbaev, M.K., Akhmedshin, A.N., Pakhotina, N.S., and Soklakov, A.F. (Acad. of Sciences, Kazakh SSR): Opyt likvidatsii zabolevaemosti svintsovoi intoksikatsiei na Ust-Kamenogorskom-svintsovotsinkovom kombinate. (THE CONTROL OF LEAD POISONING AT THE UST-KAMENOGORSK LEAD-ZINC MINES.) Gigiena Truda i Professional'nye Zabolevaniya 8, No. 9:11-13, 1964.

In the first years of operation, a high incidence of Pb poisoning occurred in the agglomeration, smelting and refining of Pb, which are among the operations at the Ust-Kamenogorsk mines, indicating ineffective controls. The greatest number of cases occurred in the first 2 processes mentioned above in 1953 (from ~50-71% of the workers showing some occupational illness). With systematic improvements in control measures, there was marked and continuing decrease in illness. Taking 1953 figures as 100%, by 1960 incidence fell to 2.3% and by 1961, to 0.5%; however, in 1962 there was some increase, to 1.2%. In 1953 a permanent commission was organized to institute an engineering and hygienic program which included education of workers, removal from work of those showing illness. For personnel protection, a special respirator was introduced which retains 93.4-97.6% of the Pb aerosols.

3216 Lee, W.R. (Univ. Manchester, England): ROBERT BAKER - THE FIRST DOCTOR IN THE FACTORY DEPARTMENT. I. 1803-1858; II. 1858 ONWARDS. British Journal of Industrial Medicine 21:85-93 (Apr.); 167-79 (July), 1964.

"'We have to announce the death of Mr. Robert Baker, C.B., formerly one of the chief inspectors of factories, in his 77th year. Mr. Baker began life as a member of the medical profession, and devoted great attention to the condition of factory operatives. In 1834 he was appointed sub-inspector of factories under the Factory Act and in 1858 was made one of the chief inspectors. On his retirement he was created C.B. of the Civil Division.' (The Times, February 10, 1880)

"The story of Robert Baker's work in the Factory Department starts at a time when the 'health of the worker' referred to the possibility of outbreaks of infectious disease and to the prolonged employment of children. As the story progresses, early attempts to control the hazards of industrial disease are seen, and the questions of the duties of the doctor in industry and of the organization of the medical supervision of small workplaces receive attention. From the successes and failures of a doctor, well placed to view these ever-present problems, we may be guided in our current attempts to deal with them."

In Part II, the events leading to the Factories Act of 1878, which was the first to appear in the form recognized currently, are reviewed. In that year, Baker reached the age of 75 and resigned from his position as 1 of the 2 Factory Inspectors (held from 1858), after he had earlier completed 25 yr of service in the Factory Department. His area covered the N-W of England, the midlands, and the W country together with the whole of Wales and Northern Ireland and at the time of his retirement contained 23,346 factories and workshops. In this position he supervised the enforcement of factory legislation and recommended changes in legislation. During this time he had worked in bringing various trades under regulations in regard to disease and hygiene (cotton mills, silk mills, pottery manufacture, and percussion cap making). He tried to effect measures to prevent harmful effects of dusts (proper ventilation, respirators), but had a defeatist air about this.

Pb poisoning was also a big industrial hazard of the period and Baker criticized the Factory Acts Extension Act of 1864 from the standpoint of housekeeping, cleanliness, and proper work clothes. He suggested that workers should wash properly before meals and before going home, that meal-time regulations in the factories should be applied to all workers (men, women, and children), and that disciplinary regulations for work-clothing should be instituted. Although Baker had at first seen the problems clearly, as the years went by he became confused and seemed to put hygienic preventive measures second to dietary treatment of the worker.

Among his other contributions were: advice that certifying surgeons visit factories regularly once a month; rigid medical supervision of all factories where children and young people were employed; changing type of employment temporarily when injurious effects were noted.

Many of Baker's ideas in industrial medicine were well in advance of his time but, probably because he was too preoccupied with the problems of the past, the control of infectious disease, and the protection of children, he failed to get his ideas implemented. However, Baker's work was recognized and appreciated by those he sought to help. (166 references)

3217 Mogilevskaya, S.E., Verevkin, N.I., Tunin, Ya.P., and Andrievich, V.V.: (MINERALOGICAL COMPOSITION OF DUSTS AS THE CAUSE OF PNEUMOCONIOSIS.) Bor'ba s Silikozom, Akad. Nauk SSSR, Sb. Statei 6:184-90, 1964.

The composition of dust deposited on the mine walls showed that during the drilling and blasting of ore and rocks all products of decomposition are deposited as dust containing large amounts of the fraction $<10\ \mu$, the most dangerous fraction of the source of pneumoconiosis. By a study of the type of dust present in surrounding rock, it is therefore possible to evaluate the degree of the dust toxicity even before mining. In ore and rock dust of the Temir-Tausk deposit Zn, Pb, As, and other elements are present. They can aggravate the toxic effect of quartz. The strict suppression of dust formation in all mine works is necessary to prevent pneumoconiosis. (From Chemical Abstracts 62:9679, 1965)

3218 Pakhotina, N.S., and Gemke, G.R. (Natl. Inst. of Pathol., Acad. of Sciences, Ust-Kamenogorsk, Kazakh SSR): Gigienicheskaya otsenka uslovii truda i sostoyanie zdorov'ya sotrudnikov spektral'noi laboratorii. (HYGIENIC EVALUATION OF WORKING AND HEALTH CONDITIONS OF PERSONNEL OF A SPECTROGRAPHIC LABORATORY.) Gigiena Truda i Professional'nye Zabolevaniya 8:50-1 (Feb.), 1964.

Complaints by personnel of the spectrographic laboratory of the Scientific Institute of Non-Ferrous Metals led in 1959 to an investigation of the hygienic conditions. The atmospheric survey of the premises included analyses of samples for Pb, As, Zn, Hg, and Se by chemical methods as well as spectrographic, and for other metallic components only by spectrography. In spite of certain provisions for ventilation, high contamination was found in the breathing zone of the workers particularly during the grinding of the metals. The men did not use respirators or other means of personal protection. The principal offenders were Pb, As and Hg. The concentrations encountered in the air samples collected at the spectrographic apparatus while no analyses were being done ranged as follows: Pb, 0.02-0.15 mg/m^3; As, 0.03-0.13; Hg was not determined. The values for the respective metals at the same site while analyses were run ranged from 0.18 and higher; 0.10-0.33; Hg, 0.05-0.10. At tables while samples were being ground, 0.11 and higher; 0.62-1.09; 0.04-0.08. In the laboratory rooms while analyses were run, 0.09-0.17; 0.04-0.28; and 0.04-0.06 mg/m^3, respectively.

All personnel, 32 men, of whom 20 complained of headaches, were subjected to medical examination. A number of them exhibited tremors, several had dermatitis. In 75% somewhat lower red cell counts were observed, and in 50% the Hb levels were 70-79% of normal and less. Other abnormalities in the blood picture included decreases in the number of leukocytes, neutrophils, monocytes, eosinophils, and thrombocytes. The following safety measures were instituted: increased ventilation, tight hoods over the spectrographs and sites where samples were prepared for analysis, enforced wearing of respirators and rubber gloves. Two shifts were established so that the number of spectrographs used was reduced and personnel were instructed as to hazards. These measures effected considerable improvement in working conditions.

3219 Pakistan, West, Labour Dept. (Lahore): THE WEST PAKISTAN HAZARDOUS OCCUPATIONS (LEAD) RULES, 1963. Gazette of West Pakistan (Lahore) Sept. 4, 1964, pp. 2835-9.

The rules contain the following provisions: Declaration of an operation as hazardous; sampling; prohibition of employment of women, adolescents and children; medical certification and examination; exhaust ventilation; floor and work benches; washing facilities; protective clothing; special provisions for white Pb; duties of employees. A model certificate of medical fitness is reproduced. (From Occupational Safety and Health Abstracts 3, No. 9:490, 1965)

3220 Figulevskaya, M.L. (Acad. Sci., Kazakh SSR): Nekotorye voprosy gigieny truda pri dobyche svintsovo-baritovykh i svintsovo-tsinkovykh rud. (INDUSTRIAL HYGIENE IN MINING LEAD-BARITE AND LEAD-ZINC ORES.) Izvestiya Akademii Nauk Kazakhskoi SSR, Seriya Meditsiny Nauk 1964, No. 1:90-1.
This study is limited to the determination of the degree of dustiness and free silica exposure of workers and the occurrence of pneumoconiosis in the mining of Pb-barite and Pb-Zn ores. The presence of Pb is mentioned as 1 of the constituents, but concentrations were not determined.

3221 Steel, J. (Univ. of Newcastle-upon-Tyne, England): HEALTH HAZARDS IN THE WELDING AND CUTTING OF PAINT-PRIMED STEEL. Annals of Occupational Hygiene 7:247-52 (Sept.), 1964.
A wide range of anticorrosive primers has been developed to prevent the deterioration of ferrous metal surfaces during fabrication processes. The welding of primed prefabricated parts into their proper position, such as is done in shipbuilding and other structural work, gives rise to toxic hazards due to the thermal decomposition of the paint film. The oxidation products of the metals or metallic salts that form the primer pigment may vary in toxicity ranging from the relatively nontoxic Fe and Ti oxides to the highly dangerous oxides of Cd, Cr and Pb. Aside from these hazards, the hydrocarbons and resins give rise to other toxic decomposition products among which are Co, N oxides, phosgene, cyanides and diisocyanates.

The occupational hygiene services at Newcastle-upon-Tyne, Slough, and Manchester have recently developed standard toxicity tests for primers, with laboratory cutting and welding processes arranged to simulate those found in the field. When the results indicate that the toxic decomposition products do not exceed their maximum permissible levels, the primer is stated to be suitable for flame cutting or welding under "open shop" conditions and for welding under enclosed conditions provided ventilation complies with the standards for good welding practice. The method used for these tests and the results obtained, using a Zn oxide primer, are described.

3222 Vengerskaya, Kh. Ya., Salikhobzhaev, S.S., Nazyrov, G.N., and Polykovskaya, M.L. (Uzbek Inst. of Sanit., Hyg., and Occup. Diseases, Tashkent, USSR): Otmyvochnaya pasta dlya rabotayushchikh v poligraficheskoi promyshlennosti. (CLEANSING CREAM FOR WORKERS IN THE PRINTING TRADE.) Gigiena Truda i Professional'nye Zabolevaniya 8:47-9 (Aug.), 1964.
Since the usual hand-washing procedure does not remove the printers' grime from the skin, workers in the printing trade use soda, sand, and other mechanical means for cleansing. Dermatologic examination had shown roughening, abrasions and scratches of various sorts after use of these means. The Pb content in the wash water (102-116 samples) of workers engaged in various jobs was analyzed before work, before meal break, and after work. The respective average concentrations found after use of hot water and soap, or soap with soda were, in mg: typesetters, 0.35 (0.01-2.10), 0.9 (0.01-6.4), 0.6 (0.20-1.33); printers, 0.40 (0.01-0.90), 0.5 (0.01-0.8), 0.4 (0.30-0.90); linotypists, 0.20 (0.001-1.40), 0.6 (0.30-1.4), 0.4 (0.10-0.50); stereotypists, 0.30 (0.40-0.84), 0.6 (0.30-0.90), 0.6 (0.27-2.50). As these values showed insufficient cleansing, a paste to be applied to the skin before washing with cold water was formulated by the authors. It consists of "OP-7" 1000 g, paraffin 160 g, 30% solution Na hydroxide 800 g, glycerin 240 ml. Analysis of 122 samples of wash water after its use before work and after work gave the following average Pb content in mg: typesetters, 0.010 (0.007-0.070), 0.02 (0.001-0.08); printers, 0.007 (0.004-0.014), 0.01 (0.005-0.02); linotypists, 0.006 (0.005-0.024), 0.01 (0.001-0.70); stereotypists, 0.020 (0.010-0.040), 0.001 (0.009-0.06). This paste is stated to promote softness of skin, maintain its elasticity, and to have slight bacteriostatic property.

VI. ATMOSPHERIC SURVEYS: POLLUTION AND EFFECTS

A. AIR

1950

3223 Brown, K. (Zurich, Switzerland): Bleibenzin und Bestimmung von Bleitetraäthyl. (LEAD-CONTAINING GASOLINE AND DETERMINATION OF TETRAETHYLLEAD.) Mitteilungen aus dem Gebiete der Lebensmitteluntersuchung und Hygiene 41:94-7, 1950.

At a symposium the technical factors of internal combustion were briefly described and the statement made that the present engines can be generated virtually only with relatively high antiknock leaded gasoline. It was calculated on the basis of an annual gasoline consumption of 220,000 tons (1948) in Switzerland that a mixture of 76 tons of pure Pb or 135 tons of Pb bromide is used. A brief description of the determination of Pb in gasoline and the chemical composition of the exhaust gases is presented. In conclusion it was stated that the TEL gasoline problem can be solveu in Switzerland, by addition of 15-20 vol % ethyl alcohol. All that is needed is cooperation of the gasoline industry.

3224 Cholak, J., Schafer, L.J., and Hoffer, R.F. (Univ. Cincinnati, O.): COLLECTION AND ANALYSIS OF SOLIDS IN URBAN ATMOSPHERES. Archives of Industrial Hygiene and Occupational Medicine 2:443-53 (Oct.), 1950.

Daily, diurnal, and seasonal variation in the atmospheric dust of a number of stations were studied from samples collected in Cincinnati with a small portable electrostatic precipitator. Nine constituents were determined; for Pb results in $\mu g/m^3$ air, averaged over a 3-yr period, were: control areas, 0.001; residential and semi-residential areas, 0.002; business and industrial areas, 0.0037. For the different seasons, Pb values were: cold months, 0.0038; cool months, 0.0043; warm months, 0.0027; over-all average, 0.0037.

3225 Högger, D. (Zürich, Switzerland): Die hygienische Bedeutung der Einführung des Bleibenzins (HYGIENIC SIGNIFICANCE OF THE INTRODUCTION OF LEAD-CONTAINING GASOLINE.) Mitteilungen aus dem Gebiete der Lebensmitteluntersuchung und Hygiene 41: 90-4, 1950.

The author reviews the history of the introduction of TEL antiknock and its attendant health hazards to the personnel manufacturing and handling the fluid in the early 20's in the US, followed by experiences in Britain when this antiknock agent was introduced there in 1944. The decision in 1947 of the Swiss Government to use the TEL antiknock agent in gasoline has led to the creation of a Commission to study the effects of Pb-containing gasoline on the population, garage mechanics, and others exposed to auto exhausts containing Pb. The conclusions of the author are that there is no need for excessive apprehension; however, the public and the auto industry personnel should be alerted as to any precautions that need to be taken.

3226 Roemmele, O. (State Vet. Res. Inst., Braunschweig, Germany): Das Problem der Bleivergiftung bei Mensch und Tier. (THE PROBLEM OF LEAD POISONING IN MAN AND ANIMALS.) Tierärztliche Umschau 5, No. 7/8: 109-14, 1950.

Pb poisoning occurs in animals in the neighborhood of Pb foundries and other industries which emit Pb fumes or dust. The most contaminated places are located in the Harz, Westphalia, the Rhineland and Württemberg. Contamination of air and of water by Pb dust or Pb wastes as well as flooding of fields by such contaminated water can also produce poisoning, finally also Pb water pipes. The physiologic and toxicologic question, the symptomatology, diagnosis and therapy of Pb poisoning in animals are discussed and measures for the control of these hazards are recommended. They consist primarily in the removal and decontamination of Pb-containing industrial dusts, in the avoidance of feeding Pb-contaminated plants, thorough cleansing of contaminated feeds, in the shielding of chicken houses against fly ash and in the education of the farmers in the affected areas. Many questions are still not clarified and need further study by means of animal experimentation. (From Zentralblatt für Arbeitsmedizin und Arbeitsschutz 1:93 (Abstracts), 1951)

1951

3227 Anonymous: AIR POLLUTION - FLORIDA. Industrial Hygiene Newsletter 11:24 (Feb.), 1951.

A troublesome problem in atmospheric pollution was presented by the operation of a small Pb smelter. Discarded storage battery plates were being reduced to metallic Pb with a small content of Sb. The dense fumes given off in the process created a serious nuisance in a nearby housing development, as shown by the fact that the Pb concentration in the smoke at a distance of 1,000 ft downwind was in excess of the MAC permitted in industrial operations. Executives of the company made some changes in the process when the hazard was

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drawn to their attention, but the nuisance persisted. The residents of the community obtained an injunction, halting the operation of the smelter until the nuisance could be corrected.

3228 Ely, D.S. (Dept. Public Health, Pittsburgh, Pa.): AIR POLLUTION IN PITTSBURGH. A.M.A. Archives of Industrial Hygiene and Occupational Medicine 3:44-7 (Jan.), 1951.
A study was made of the mineral matter in dust in 8 areas of Pittsburgh. The average content of Pb monoxide for all districts in 1949 was 0.05% and for 1948 it was 0.005%.

3229 Lamb, F.W., and Niebylski, L.M. (Ethyl Corp., Detroit, Mich.): FORMATION OF ENGINE-DEPOSIT COMPOUNDS BY SOLID-STATE REACTIONS. X-RAY DIFFRACTION STUDY. Analytical Chemistry 23:1388-97 (Oct.), 1951.
In making an X-ray diffraction study of the inorganic Pb compounds occurring in engine deposits, the importance of their formation by solid-state reactions was recognized. In a study of numerous solid-state addition and replacement reactions between inorganic Pb salts, it was learned that all the compounds commonly found may be produced as a result of addition reactions which take place in the solid state between various Pb salts and Pb monoxide when mixtures of these are heated at temperatures well below their melting points. The resulting or surviving products of the solid-state reactions are determined only by the temperature and by the mole ratio of the Pb monoxide to the normal Pb salts. Examples are given of increased reactivity due to the ability of metastable yellow Pb monoxide to form a reactive red Pb monoxide when heated in the presence of a 2nd compound with which Pb monoxide will readily form an addition product. This property is believed to be important in the mechanism of the solid-state reactions studied, and its possible relation to engine combustion phenomena is suggested. Interplanar spacing values are given for the major reflections of inorganic Pb compounds commonly occurring in engine deposits: $PbO.PbBr_2$ (2 forms), $PbO.PbCl_2$, PbO.-PbCl.Br (2 forms), $2PbO.PbBr_2$, $2PbO.PbCl_2$, 2PbO.PbCl.Br, $PbO.PbSO_4$, and $4PbO.PbSO_4$. (From authors' abstract)

1952

3230 Bainbridge, R. (Consolidated Mining and Smelting Co. of Canada, Trail, B.C.): LEAD BLAST FURNACE GAS HANDLING AND DUST COLLECTION. Journal of Metals 4, Transactions Aime 1302-6 (Dec.), 1952.
Consolidated Mining and Smelting Co. of Canada has operated a Pb smelter at Trail, B.C. This company commenced planning a program of smelter revision and modernization some years ago. The 1st stage of this program involved design and construction of a new blast-furnace gas-cleaning system. The essential problem was to clean and collect 100 tons of dust/day from 153,000 cfm (12,225 lb/min) of Pb blast furnace gas varying in temperature from 350-1100°F. It was desired to collect the dust dry; therefore either a baghouse or a Cottrell cleaning plant was to be selected. The equipment, design of facilities, and preliminary operating details of the baghouse system (chosen because of limitation of space) are described.

3231 Cholak, J. (Univ. Cincinnati, O.): THE NATURE OF ATMOSPHERIC POLLUTION IN A NUMBER OF INDUSTRIAL COMMUNITIES. Proceedings of the Second National Air Pollution Symposium, 1952, pp. 6-15.
The purpose of the report was to describe the nature of air pollution in Cincinnati, and to compare Cincinnati data with findings obtained during the course of shorter studies in other communities, as well as with observations reported in the literature. Pollutants discussed were: CO, CO_2, N oxides, aldehydes, SO_2, chlorides, ammonia and its salts, F, and particulate matter.

The average composition of suspended matter in the Cincinnati atmosphere showed Pb ranging from 0.1-11.5 $\mu g/m^3$ air in 724 samples, mean for all areas sampled being 2.7 and the rural area mean, 1.2. Quantities of the 22 individual components tended to vary with the increasing activity of an area. For Pb, increase in quantities occurred proceeding from rural through industrial areas, with density of traffic also affecting quantities. Yearly Pb variations for various sections in Cincinnati (rural, residential, industrial and commercial, all areas, respectively) in $\mu g/m^3$ air were: 1946-47: 0.8, 2.3, 4.1, 3.0; 1947-48: 0.95, 1.6, 3.4, [illegible]; 1948-49: 1.1, 1.7, 3.6, [illegible]; 1949-50: 1.3, 1.7, 3.5, 2.5; 1950-51: 1.2, 2.3, 3.0, 2.6; 5-yr av: 1.1, 1.94, 3.3, 2.7. The drop in average Pb concentration in the atmosphere in 1947-48 was due to a city code requiring the use of low volatile coal in hand-fired units, increased use of gas and oil for industrial purposes, and installations controlling fly-ash emissions. From then on the average remained stationary. In comparing communities the following figures for atmospheric Pb in $\mu g/m^3$ air were given: Cincinnati, 2.7; Baltimore, 1.0; Charleston, 0.6; Donora, [illegible]; Los Angeles, [illegible]-6.0. (16 references)

3232 Cholak, J., Schafer, L.J., and Hoffer, R.F. (Univ. Cincinnati, O.): RESULTS OF A FIVE-YEAR INVESTIGATION OF AIR POLLUTION IN CINCINNATI. A.M.A. Archives of Industrial Hygiene and Occupational Medicine 6:314-25 (Oct.), 1952.
This report concerns the nature and quantities of some of the commoner materials which were found in the atmosphere in Cincinnati from Nov 1946-Nov 1951 covering 12-18 fixed stations. Determined were: settled dust, suspended matter, S compounds, halides, CO, CO_2, aldehydes, nitrates, and odors. Twelve pollutants, including Pb (<0.01-1.7%, av 0.122%), were analyzed quantitatively in ~300 samples of settled dust. (See also preceding abstract)

3233 McCabe, L.C. (US Bur. Mines, Washington, D.C.): ATMOSPHERIC POLLUTION. Industrial and Engineering Chemistry 44:113A-4A, 116A (Jan.), 1952.
The concentration of Pb in the Los Angeles atmosphere, based on area sampling, was calculated to be ~0.0065 mg/m^3 (TLV = 0.15 mg/m^3). From industrial sources this probably occurs as Pb oxide and

from automotive exhausts as Pb chloride or bromide. The role of Pb fumes as possible smog-forming contaminants in Los Angeles air is still a matter of conjecture. Nevertheless, a concentrated effort is being made by nonferrous industrial concerns to reduce Pb emissions in order to protect employees and improve air hygiene. These reductions are aimed at Pb reclaiming operations, Pb alloys, and Pb in furnace fumes (ie, stack effluents, recovery equipment).

3234 Ryazanov, V.A. (F.F. Erisman San. Inst., Ministry of Health, Moscow): BASIC PRINCIPLES OF HYGIENIC STANDARDIZATION OF ATMOSPHERIC AIR POLLUTANTS. In Ryazanov, V.A., ed.: Limits of Allowable Concentrations of Atmospheric Pollutants, Book 1, Moscow, Medgiz, 1952, translated by B.S. Levine, Washington, US Department of Commerce, Office of Technical Services, 1959, pp. 8-23.

The principles of the Committee for the Determination of Allowable Concentrations are discussed. The headquarters of this Committee are at the F.F. Erisman State Sanitary Institute. In this report, norms for 10 pollutants and their substantiation are given. Additional material will be published by the Committee as results of further investigations accumulate. The author admits that the limits are not based on irrefutable evidence; indeed, they are also based on some arbitrary assumptions and values. The norms presented here should be evaluated as collective opinions of groups of specialists who, in the light of existing knowledge, agreed that certain concentrations could be adopted as limits of allowable concentrations; they will be subjected to reexamination, refinement, correction and revision as more scientific and basic evidence accumulates. Emphasis is laid on the study of the higher nervous activity, on which practically no data were available at the time of preparation of the report. The 10 substances for which MAC's were proposed include Pb: for single exposure, not determined; daily average, 0.0007 mg/m^3. A note specifies that the norm for Pb does not apply to TEL; this will be specified later. Requirements for the calculation of levels of exposure, discharges from source, collection and determination procedures are outlined.

3235 Ryazanov, V.A., Alekseeva, M.V., and Benderikhina, D.Ya.: METHODS FOR THE COLLECTION AND STUDY OF AIR SAMPLES IN THE CONTROL OF ATMOSPHERE CLEANLINESS IN INHABITED LOCALITIES. in Ryazanov, V.A., ed.: Limits of Allowable Concentrations of Atmospheric Pollutants, Book 1, Moscow, Medgiz, 1952, translated by B.S. Levine. Washington, US Department of Commerce, Office of Technical Services, 1959, pp. 89-125.

The determination of Pb in air is included (pp 120-1). The colorimetric method used, which is based on a reaction with K chromate, has a sensitivity of 0.001 mg/ml. The limit of allowable concentration of Pb in atmospheric air is given as 0.28 μg/m^3.

3236 Tomson, S.A.: LIMITS OF ALLOWABLE CONCENTRATIONS OF LEAD IN THE AIR OF RESIDENTIAL REGIONS. In Ryazanov, V.A., ed.: Limits of Allowable Concentrations of Atmospheric Pollutants, Book 1, Moscow, Medgiz, 1952, translated by B.S. Levine. Washington, US Department of Commerce, Office of Technical Services, 1959, pp. 65-74.

The occurrence of Pb in nature, including the animal organism is briefly reviewed on the basis of the Russian literature. Pollution of air by various processes is discussed. Examples: in the smelting of silver, the air becomes polluted with dust which may contain 23-45% Pb. In the Dwight-Lloyd process of calcining Pb ore, the air in close proximity may contain 273-1799 mg/m^3 dust with 109-245 mg/m^3 Pb. It was estimated that 24 tons of Pb are discharged annually by 1 calcining oven. The slag contains 0.8-1% Pb; it should not be used in street and road improvement. The efficiency of E-filters for the control of Pb-containing dust was found to be 94-96%. The quantity of dust falling out of the air near a nonferrous metallurgical plant was found to be (in mg/m^3/day): at 100 m, 2602; at 300 m, 2141; at 500 m, 1355; Pb content, in %: 6.7, 0.4, 1.4, respectively. Dust washed off window panes contained Pb in mg/m^3 on the outside of the building: at 300 m, 8.0; at 800 m, 2.3; at 1,000 m, 0.3; on the inside: 0.3, 0.5 and 1.5 mg/m^3, respectively. By the aspiration method, the air over the factory grounds contained 0.05 mg/m^3 Pb; at 300 m from factory, 0.02 mg/m^3. Fly ash from coal combustion contains 0.015-0.01% Pb and is a constant source of pollution. A distinction is made of the hazards of Pb exposure as to ingestion vs inhalation. The latter is more harmful since Pb bypasses the liver and enters the blood stream in a more direct manner. Kantaron found Pb by inhalation to be 10 to 100 times as toxic as Pb is by ingestion. The significance of the physico-chemical state of Pb and particle size and health hazard are discussed. Experiments with rats kept for 5 mo at 300 m distance from the point of discharge of a nonferrous metallurgical plant, atmospheric Pb 0.02 mg/m^3, proved that the continued inhalation of this concentration led to an accumulation of Pb in the organs, which can produce chronic poisoning. Accumulation of Pb in leaves and soil near the factory was also demonstrated. On the basis of Kehoe's observations the daily ingestion of 0.15-0.20 mg Pb causes no harm; since, however, inhaled Pb is 10-100 times as toxic, the safe daily intake via respiration should be 0.0015-0.0020 mg. On the basis of a daily air ventilation of 15 m^3, the air breathed in should not contain more than 0.00010-0.0013 mg/m^3. The author proposes the average of the 2 values, 0.7 μg/m^3 as the maximum allowable concentration in air in residential regions. This is ~14 times lower then that for workrooms, which is 10 μg/m^3. The low MAC of 0.7 μg/m^3 is justified on the basis that if 1.23 mg% is taken as the average Pb content of clean soil, an atmospheric dust concentration of 0.2 mg/m^3 will contain 0.0025 μg/m^3 Pb, and one of 2 mg/m^3, 0.025 μg/m^3; thus, the proposed MAC exceeds the Pb concentration of clean air at least 28 times.

3237 West Virginia Department of Health, Bureau of Industrial Hygiene, and Kettering Laboratory, College of Medicine, University of Cincinnati: ATMOSPHERIC POLLUTION IN THE GREAT KANAWHA RIVER VALLEY INDUSTRIAL AREA. FEBRUARY 1950-AUGUST 1951. Report prepared with consultation and assistance by the U.S. Public Health Service, Division of Occupational Health, 1952. 168 pp.

The purpose of this study was to (1) establish factual information as to the air pollution problem of the Valley, (2) compare the present particle-fall load to that of a previous survey made by the Bureau of Industrial Hygiene from June 1945-December 1947, and (3) determine the present or future needs of establishing an aggressive air pollution control program for the area. It was not the intent to study the effect on health of the air pollutants in the Valley nor to determine the specific control measures that might be needed. The work is divided into 5 chapters: (1) General information, scope of survey, methods of survey, and factors limiting survey; (2) presentation and interpretation of pollution data collected by the Bureau of Industrial Hygiene of airborne contaminants other than that measured by particle-fall methods, also an account of some noticeable adverse effects due to air pollution in 1950-51; (3) particle-fall study by the Bureau of Industrial Hygiene including comparison of data obtained with previous soot-fall study by the Bureau; (4) presentation and interpretation of atmospheric pollution data of studies by the Kettering Laboratory using mobile sampling unit with a summary of results obtained (report prepared by J. Cholak and L.B. Roberts); (5) emissions to the atmosphere (exclusive of the area from Cabin Creek to Glen Ferris).

A table giving concentrations of 18 elements (collected with high volume filter samplers) in the atmosphere as found in particulate matter at 9 locations in the Great Kanawha River Valley industrial area listed Pb as ranging from 0.01-0.65 μg/m^3 air. The 8 stations and their results were: Chelyan, 0.18; Station Belle, 0.01; Kanawha City, 0.12; Charleston, 0.65; North Charleston, 0.12; South Charleston, 0.02; South Charleston station, 0.02; Saint Albans, 0.16; Nitro, 0.18. Another table showing results of spectrographic analysis of particle fall collected at 17 stations for the month of July 1951 showed Pb ranging from 0.015->0.2 mg/10 mg of particle fall. All stations registered >0.2 except 2 (Belle, 0.015 and South Malden, 0.08). In response to questionnaires to various plants, railroads, steamboats, municipal operations, laundries, lumber mills, and hospitals, Pb fume was emitted to the atmosphere from industrial processes at a rate of 0.4 tons/day. Total particulate matter emitted was 505 and total gases and vapors, 369 tons/day.

The results of the study showed that a major air pollution problem does exist in the Great Kanawha River Valley industrial area, particulate matter, gases, and vapors constituting a major portion of the problem. While some of these latter are known to be extremely toxic in sufficient concentration, their toxic effects in the lower concentrations found in this survey are unknown. It was further concluded that the major air pollution load of the area is undoubtedly of industrial origin.

1953

3238 Boldyrev, T.E. (USSR Chief State Sanitary Inspector), and Zhdanov, V.M. (Chief of Main Sanitary-Epidemiologic Administration, USSR Ministry of Health): A COLLECTION OF MOST IMPORTANT OFFICIAL ITEMS RELATED TO SANITARY AND ANTI-EPIDEMIOLOGICAL (PROPHYLACTIC) PROBLEMS. AN AID TO THE STATE SANITARY INSPECTOR-PHYSICIAN AND PHYSICIAN-EPIDEMIOLOGIST. 3d. ed. Medgiz, Moscow, 1953. In Levine, B.S.: USSR Literature on Air Pollution and Related Occupational Diseases. Washington, US Department of Commerce, Office of Technical Services, 1961, Vol. 6, pp. 113-48.

Volume 2 of above publication deals, in Part 4, with industrial sanitation: Chapter 1. Preliminary Inspection. 1. Sanitary Standards for Planning Industrial Enterprises. ISP 101-51 (replacing GOST 1324-47). The present standards apply to the planning of new, or improving and rebuilding of existing industrial establishments. The basic requirements for general planning are defined, such as site of enterprise, conditions, classification of industries according to volume of discharges with magnitude of required clearance zone. In Supplement 1, the types of industries are listed under the Sanitary Classifications of Production and Processing Plants in Relation to Sanitary Clearance Zones: A clearance zone 1000 m wide is required for smelting of non-ferrous metals directly from ores or concentrates, including Zn, Pb, Sn, Ni; a 500-m-wide zone, secondary processing of non-ferrous metals in quantities up to 3000 tons/yr; a 300-m-wide zone, production of storage batteries on a large scale, of non-ferrous metals up to 1000 ton/yr, of Pb-coated or rubber-insulated cables; a 50-m-wide zone, thermal working up of metals (except founcries), production of batteries on small scale; a 500-m-wide zone for production of Pb, As, and Mn ores.

Supplement 2 lists contraindications for employment of workers in industries: specific contraindications apply to workers undergoing periodic medical examinations; in addition, there are general contraindications for employment of workers. These are presented in 3 lists for Pb and its organic compounds, Pb containing gasoline, and TEL and ethyl fluid. The contraindications are certain disorders of the central and peripheral nervous system, the endocrine system, visual and auditory apparatus, cardiovascular, liver, kidney, alcoholism and all diseases of the respiratory system contraindicating use of gas masks.

Supplement 3 gives the Limits of Allowable Concentrations of Poisonous Gases, Vapors and Dust in the Air of Working Zones in Industrial Premises. Those applying to Pb and its inorganic compounds, Pb sulfide excluded, are 0.00001 mg/l, and for Pb sulfate, 0.0005 mg/l.

Supplement 4 includes Sanitary-Hygiene Labor Protection Regulations, Item 27, Periodic Medical Examination of Workers (from Order No. 443, dated June 17, 1949). Production and occupations involving Pb exposure requires according to industry and operations, from mild anorexia to [illegible] unusual ex[illegible].

3239 Bridge, A. (Children's Hosp., Melbourne, Australia): LEAD INTOXICATION IN THREE FAMILIES. Medical Journal of Australia 2:62-3, 1953.
Five children and 5 adults in 3 families were found to have absorbed Pb from a common source. Three of them had clinical symptoms. One child of 18 mo had Pb encephalopathy; one, age 2 yr. 9 mo., had gastrointestinal symptoms; and 1 adult had malaise and pains in the limbs. The remainder all had definite evidence of Pb absorption, but no symptoms. Investigation of the source revealed that the houses in which these families lived were in a narrow lane with a coffin factory opposite. Pb used in fittings was molded and polished in the back of the factory, and 2 extractor fans blew dust from the factory into the lane. There were also many small waste pieces in the gutters that were being collected by the children to play with. The urinary Pb concentrations ranged from 0.03-0.55 mg/l. Findings in all 10 cases are briefly described.

3240 Cook, E.B., Smith, R.W., Jr., and Brinkley, S.R., Jr. (U.S. Bur. Mines, Pittsburgh, Pa.): EQUILIBRIUM COMPOSITION OF COMBUSTION PRODUCTS OF LEADED OCTANES WITH AIR. U.S. Bur. Mines Rept. Invest. No. 4947, 1953, 15 pp.
Results are given of the calculations of equilibrium composition of the products of combustion with air of 6 different mixtures of octane (C_8H_{18}) plus TEL and halogen-bearing scavengers at 3 air-fuel ratios at pressures of 5 and 30 atmospheres and at temperatures of 350, 1000, 1800, and 2000°K. The air-fuel weight ratio has the values 1.200, 1.512, and 1.800. The concentration of TEL in ml/gal isoöctane had the value of 1 or 3. (From Chemical Abstracts 47:6127, 1953)

3241 Fatzer, R. (Wädenswil, Switzerland): Anzeichen von Bleivergiftung? (SIGNS OF LEAD POISONING?) Schweizerische Medizinische Wochenschrift 83, No. 27:631-3, 1953.
Air pollution and hazards to health arising from the use of leaded gasoline are discussed and illustrated with the author's observations acquired in his dental practice from patients regarded by their physicians, in many cases, as hysteriacs or malingerers because of their various unexplainable ailments ranging from headache, dry nose, colitis, kidney disturbances, rheumatic signs, tremor, etc to itching of the skin, eczema, temporary visual impairments, and others. He describes his own case when he and his wife got sick after a car trip during which they had been exposed to gasoline odor coming from a faulty carburetor. For several days he had suffered from backache accompanied by vegetative dystonia and inflammation of the nose with abscess formation while his wife had impetigo-like skin lesions of the nose. Personal communications with garage workers, families living in apartments located above garages, and others, as well as his own experiences are quoted as evidence against the use of leaded gasoline.

3242 Kane, J.M., and Walpole, R.H. (Am. Air Filter Co., Louisville, Ky.): PRINCIPLES OF PRESENT-DAY DUST COLLECTORS AND THEIR APPLICATION TO MINING AND METALLURGICAL INDUSTRIES. Transactions of the American Institute of Mining and Metallurgical Engineers 196, Technical Publication No. 3427-B; Mining Engineering 5, No. 1:85-8, 1953.
While the review concerns the evaluation of dust collectors to improve working and operating conditions, the authors point out that when there are possibilities of air pollution or public nuisance, and/or when there is a valuable product to be collected, selection is often guided by the maxim of "highest available collection efficiency at reasonable cost and reasonable maintenance." The principles of dry centrifugal collectors, fabric arresters, wet-type collectors, the high-voltage Electro-Static precipitator, and high-temperature gas cleaning are discussed. In connection with the latter, the Pb sintering process is discussed; there, the loss of salvageable material and atmospheric contamination require maximum dust control measures. High dust loads occur, varying from 3-10 grains because of the release of hot gases, as do duct accumulations since gases in the exhaust system are frequently below the dew point. Test analyses, using good wet collectors gave collection efficiency >99% Pb.

3243 Widmaier, O. (Lingen, Germany): Reaktionszerfall von Bleibenzin. (DECOMPOSITION REACTIONS OF LEADED GASOLINE.) Brennstoff-Chemie 34, No. 5/6:83-7, 1953.
Autoclave experiments with a 10% ethyl-fluid-containing gasoline solution showed that with the use of S-free gasoline, Pb bromide, oxide, triethyl Pb bromide and oxidized hydrocarbons occur as decomposition products. The decomposition of the ethyl fluid is principally temperature dependent. At temperatures up to 100°C and pressures of 20-60 kg/cm^2 mainly Pb oxide is formed; at higher temperatures and various pressures, the formation of Pb bromide is favored. The Pb triethyl bromide forming at lower temperatures (up to 100°C) and high pressures (60 kg/cm^2) has good antiknock properties. (From author's summary)

1954

3244 Cholak, J. (Univ. Cincinnati, O.): MEASUREMENT OF AIR POLLUTION. A.M.A. Archives of Industrial Hygiene and Occupational Medicine 10:203-9 (Sept.), 1954.
In discussing the title subject, the author points out that the determination and measurement of the constituents of the atmosphere on a comprehensive scale are of rather recent origin. Interest has been stimulated by dramatic incidents such as the Meuse Valley (1930), Donora (1948), Poza Rica (1950) and London (1952) disasters. While investigating air pollution around well-defined industrial processes is often a simple matter, the measurement of air pollution in relation to community health offers many difficulties, not the least of which is the fact that single pollutants can rarely be incriminated. In only 1 of the above disasters (Poza Rica) could a single pollutant be held responsible (H_2S). The exact composition of the atmosphere will always remain somewhat indeterminate because it contains a great variety of

materials, not all of which are man-made. From time to time numerous materials of known toxicity will be reported as having been found. While very sensitive analytical methods are available for the determination of many of the pollutants, there are a number of common pollutants for which no specific methods are available. For this reason, even so-called comprehensive investigations are concerned with the determination of relatively few pollutants. Examples of this situation are given in respect to several investigations in the US and England. Among them, recent data from a cooperative country-wide investigation of the USPHS and the Kettering Laboratory are shown in a table, giving averages and ranges, and, for comparison, threshold concentrations for Pb, Hg, Cd, As, Se, S compounds, nitrates and benzpyrene, in which Pb values are 2.0, 0.1, and 150 $\mu g/m^3$, respectively.

In closing, the author states that although data are available on certain air pollutants, procedures and equipment are lacking for collecting and analyzing these and many other pollutants during adverse weather conditions, and that no satisfactory understanding of the impact on community health can be achieved without fairly comprehensive information of this type. (18 references)

3245 Günther, H.: Fütterungsversuche mit Flugstaub einer Metallhütte an Pferden und einem Schaf. (FEEDING EXPERIMENTS IN HORSES AND A SHEEP WITH FLUE DUST FROM A METAL FOUNDRY.) Dissertation, Veterinary College, Hanover, 1954, 47 pp.

Signs of poisoning were observed in animals grazing within a 5-km radius around a Zn and a Pb foundry. Analysis of the flue dust in 1951-52 in these areas and around 2 Dwight furnaces showed it to contain 5.21-53.5% Zn, 5.2-44.8% Pb, and smaller amounts or traces of S, Cl, Cd, As, Fe, and F. Cattle, and particularly young horses, showed signs thought to be characteristic of chronic and/or acute Pb poisoning. There was rapid emaciation, cachexia, swelling and stiffness of joints; milk production decreased. The foundries granted compensation for dead animals with livers showing ≤0.2 mg Pb/100 g. Findings on 3 affected colts are reported in detail. Two showed leukocytosis; otherwise the blood findings were not remarkable. Rickets could be excluded. Of interest was the finding at necropsy of an increased volume of synovial fluid in affected joints and detachment of the articular cartilage from the bone. Analysis of the livers for Pb and Cu gave 0.23-0.39 and 1.0-3.4 mg/100 g, respectively. A colt and a sheep were fed hay grown around the Pb foundry (60-65 mg Pb/kg content) and flue dust collected from the Pb foundry (44.8% Pb) with their ration. The colt received 5 g of the dust 3 times/day for 22 days and 20 g/day for another 7 days. It became unable to swallow, the mucosa appeared icteric, leukocytes increased greatly. Toward the end of the feeding period, severe paralysis of the recurrent nerve caused swallowing difficulties and led to pneumonia. This, and the "roaring" found in the affected areas were attributed to Pb poisoning. The liver contained 1.52 mg Pb/100 g. The sheep was given flue dust in doses increasing from 2-24 g/day. When the appetite decreased sharply, the dose was reduced to 4 and 2 g. The liver was found to contain 0.14 mg Pb/100 g at the end of the experiment. This relatively low content is thought to be attributable to differences in the metabolism of Pb in the 2 species.

The author carried out an experiment on a 9-mo-old colt, not previously exposed, by feeding it flue dust from 1 of the plants (23.41% Zn, 16.87% Pb, 5.8% Fe, 12.53% S, 2.23% Se, 0.05% F, 0.12% As). The daily dose in the ration (in the later stages the dust was administered through the nose) was variable (in g with number of days in parentheses): 3 (8), 5 (13), 8 (26), 10 (12), 15 (6), 20 (9), 30 (48); after 15-day interruption, 20 (31), 40 (29) followed by sacrifice. A total of 3270 g flue dust was thus ingested. The appetite began to decrease at the 10-g dose; the gait became stiff, the animal appeared very sick. The leukocyte count increased and fluctuated, the Pb content in the blood was 0.466 mg/100 ml in the highly acute stage and 0.200 mg/100 ml shortly before death. Necropsy revealed no macroscopic changes. Microscopically, the liver contained some fine intracellular yellow-brown pigment and the kidneys were slightly necrosed. Analysis of tissues and fluids yielded, in mg Pb/100 ml, 0.200 in the blood, 0.055 in the spinal fluid; in mg Pb/100 g, 2.770 in the liver, 0.670 in the kidneys; 0.06% F in the rib bones (ash). Although the F content of the flue dust was low, special attention was paid to it because of the bone changes observed. The author's opinion is that this was not purely a Pb or F injury but one attributable to the combined action of several constituents of the flue dust. Thus, in this instance the syndrome should be considered as an injury typical of flue dust.

1955

3246 Chambers, L.A., Foter, M.J., and Cholak, J. (US Public Health Service, Cincinnati, O.): A COMPARISON OF PARTICULATE LOADINGS IN THE ATMOSPHERES OF CERTAIN AMERICAN CITIES. Proceedings of the Third National Air Pollution Symposium, Pasadena, California, April 18-20, 1955, pp. 24-32.

In an air sampling program carried on in ~30 major US cities, ~90 high-volume samplers are routinely contributing to the survey, representing practically all geographic subdivisions and possessing the statistically desirable feature of randomness in many respects. Sampling sites operate from a daily to weekly basis. Each sample, taken from urban, suburban and rural sites, represents a total of particulate matter in sizes down to 0.3 μ removed from ~2000 m^3 of air during a 24-hr period by the Staplex high-volume sampler. Each sample is subdivided and distributed among appropriate laboratories for determination of total particulate weight, radioactivity, organics, proteins, and a variety of inorganic cations and anions. Data from about half the urban areas are now available to justify preliminary presentation. Total maximal urban air loadings, involving ~2000 samples analyzed for particulates, soluble organics and proteins, and ~500 samples for inorganic components gave a maximal total of 3112 $\mu g/m^3$ which amounted to 26.6 μg. In most cases, the figures represent extreme 24-hr integrated dosages obtained under most adverse conditions encountered in an 18-mo survey.

[illegible] cities with populations >2,000,000 sampled for at least [illegible] of the year) showed a high organic-[illegible] average and a high [illegible] particulate fraction ([illegible] wt), almost the same as the average of the country. Pb, the occurrence of which [illegible] related to the production and combustion of Pb-containing fuels, amounted to an average of 4.1 μg in Philadelphia, 3.1 in Los Angeles, 2.8 in Chicago, and New York, and 2.4 in Detroit. Values for the same types of averages for cities of intermediate populations (500,000-2,000,000) showed a total Pb of [illegible] μg/m³ ([illegible] cities) with averages of Pb ranging from 0.5 μg/m³ in Minneapolis to 2.4 μg/m³ in San Francisco. The other cities were: Cincinnati, Kansas City, Portland, Atlanta, Houston. Four small cities with atypical (high) loadings for particulate matter in smoke (Anchorage), heavy industry (Charleston, W.Va.), dust storms (Ft. Worth), or other unknown causes (Louisville) showed a total particulate load ranging from 306 μg/m³ (Anchorage) to 156 (Ft. Worth). Pb concentrations ranged from [illegible] μg/m³ (Charleston) to 3.2 (Anchorage). Five nonurban areas gave a total average load of 35 μg/m³, the composition seeming to relate best to the composition of the local topsoil. Pb values ranged from [illegible] μg/m³.

Information on patterns of daily and seasonal fluctuations for the various urban and non-urban, and some of atypical areas mentioned above, are included and illustrated by several figures and graphs. Although only [illegible] revealed no obvious seasonal factor for particulate loadings in the [illegible] indicated that the causes of the central city [illegible] load must be sought within the city itself [illegible] in terms of regional climatology. However, the authors point out that evaluation of the data may not meet the demands for perfection, as they do not, for instance, include analysis of vapors and gases, and that many choices have had to be made on the basis of practical expedience rather than scientific merit, thus leaving room for possible criticism of data presented.

3247 Cholak, J., Schafer, L.J., Yeager, D.W., and Kehoe, R.A. (Univ. Cincinnati, Ohio): THE NATURE OF THE SUSPENDED MATTER. In Renzetti, N.A., ed.: An Aerometric Survey of the Los Angeles Basin August-November, 1954. Los Angeles, Calif., Air Pollution Foundation, Report No. 9, 1955, pp. 201-25.

The particulate matter in the atmosphere of the Los Angeles area, collected daily at 2 stations for 4 mo (Aug-Nov 1954) was analyzed to determine its composition and the fluctuations in the concentration of certain components, and compared with that found in other metropolitan areas for the same period of time. The amounts of Pb present in ~2500 spot samples of dust collected on paper tapes with AISI smoke samplers were determined by a chemical method.

Mean Pb results (ranges in parentheses) for the 2 stations (Los Angeles station 3 and Pasadena station 4) for Aug, Sept, Oct, and Nov, respectively, in μg/m³ air, were: Station 3: 0.13 (1.7-7.6); 6.2 (1.4-14.7); 7.5 (3.1-13.8); 8.3 (3.2-16.4). Station 4: 2.2 (1.1-4.1); 4.4 (0.8-12.8); 5.0 (1.9-10.4); 4.65 (1.2-11.4). The same Pb information for 30 metropolitan areas in the US and Alaska during 1954 was 2.15 μg/m³ air (0.1-40.5). Thus the average concentration of Pb in the atmosphere of the Los Angeles area was 2-3 times greater than that for the 30 metropolitan areas. However, the maximum concentration found was lower than the maximum which occurred from time to time in the atmosphere of certain other American communities. The highest concentrations of Pb in the Los Angeles area occurred usually during periods of low-lying haze. The highest single concentration during the investigation (16.4 μg/m³ air) occurred during the 2-wk period which began at noon on Nov 14. Figures are also given which illustrate that the Pb concentration at both Los Angeles stations increased during the early hours of the evening. In addition, daily averages, in μg/m³, of particulate Pb compounds analyzed in the atmosphere of certain cities were tabulated: Los Angeles, 6.35; Pasadena, 4.12; New York and Chicago, 4.24; cities of >2 million population, 2.79. (13 references)

3248 Bettling, J. ([illegible] Bern, Switzerland): Zur hygienischen toxikologischen Bedeutung von Bleistaub aus dem Auspuff von mit Bleitetraäthyl-haltigem Benzin betriebenen Motoren. (HYGIENIC AND TOXICOLOGICAL IMPORTANCE OF LEAD DUST IN EXHAUSTS OF MOTORS DRIVEN BY TETRAETHYL LEAD PETROL.) Archiv f. Gewerbepathologie und Gewerbehygiene 13, No. 6:624-36, 1955.

The investigations of Kehoe and Machle in the USA over a period of 8 yr into the use of TEL-containing gasoline as a motor fuel indicated that the addition of TEL in the permissible proportion of 1:1260 was harmless to drivers and to the general public. Its addition was, however, forbidden in some European countries after the occurrence of some cases of severe poisoning in 1925.

The author has investigated the possible contamination of the atmosphere by TEL and its combustion products, especially in crowded roads, by estimating the Pb content of the dust. Pure TEL is never used in cars and airplanes, but as a mixture with ethylene halogens ("ethyl fluid"), so as to avoid the deposition of PbO on the cylinders and to expel as much Pb as possible in the exhaust. In the presence of chlorinated and brominated hydrocarbons pure TEL is decomposed into triethyl Cl or Br compounds, which volatilize at 300°C. There is thus no danger of injury from the vapor of TEL but a potential danger from Pb dust and residues.

The dust from the exhaust of an Opel car and an army jeep was examined by passing it directly from the exhaust on to a nitrocellulose film on the slide of an electron microscope. Numerous solid globular particles, between 10 and 100 mμ in size (av 30.6 mμ for the Opel and 35.4 mμ for the jeep) with some aggregates, and a few larger white flakes, representing rust and oil, were observed. A control experiment with pure gasoline showed no globular particles. Radiographic and microchemical examination showed the presence of $PbSO_4$, insoluble in water, $PbBr_2$, soluble in water ([illegible]) and probably some PbO. The total amount of dust in 1 m³ was 1.25-1.5 mg, and its Pb content 0.3-0.6 mg/m³. This was a smaller amount than that of a chemical investigation in 1950 when the Pb content was 8.3 mg/m³. The difference is explained by the fact that in the filter method used in this investigation particles <5 mu in size are excluded, suggesting that the chief constituents of the dust are finer than the granules observed by the electron microscope, and this fine particle size may indicate the danger of deposition in the bronchial system. A comparison of the amount of Pb in the dust of streets with automotive traffic and field roads showed a content 100 times higher in the former, but this was small in comparison with the dust of Pb works and garages. (The work here described was performed by the "EMPA" (Society for Testing Materials) for the Federal Leaded Gasoline Commission of Switzerland.)

3249 Hupka, E. (Veterinary Coll. Hanover, Germany): Über Flugstaubvergiftungen in der Umgebung von Metallhütten. (POISONING BY FUME DEPOSITS ON PASTURE IN THE VICINITY OF METAL WORKS.) Wiener Tierärztliche Monatsschrift 42:763-7, 1955.

The author's conclusion in regard to the illness affecting cattle and horses at pasture within a 5-km radius of Pb and Zn foundries, is that the peculiar clinical picture of the poisoning was due to Pb in combination with another toxic substance, probably Zn. (Findings were described and summarized by Günther in his thesis published in 1934.)

3250 Jecklin, L. (Basel, Switzerland): Bleistaub in der Luft. (LEAD IN AIR.) Schweizerische Medizinische Wochenschrift 85:685-6, 1955; Leben und Umwelt 1:234-5, 1955.

Since 1947, Swiss gasolines contain ethyl fluids as an anti-knock agent, consisting of (in weight %): TEL 63.3, ethylene bromide 25.8, ethylene chloride 8.7, and coloring matter 2.2. One liter of gasoline contains 0.4-0.6 ml TEL (or 425-640 mg "pure" Pb), 0.6 being the MAC in both Swiss and German gasolines. Frequently, gasolines also contain TCA (o-tricresylphosphate) to reduce the deposition of Pb oxide in the engine, and 0.02-0.03 weight % of S. It is estimated that only 15-35% of the Pb contained in the gasoline is removed with the exhaust gases, but according to investigations carried out by the Shell Corporation, only 2-3% of the gasoline Pb is deposited in the engine. Supposing a car uses 10 l. of gasoline/100 km, the Pb deposit after driving it for 50,000 km would amount to 1625-2125 g, which seems to be rather high. Pb content of the exhaust gases varies with type of motor and is lowest during idling of the motor. Experimentally, an Austin A-30 car which had run 15,000 km was powered with Shell supergasoline, Pb content of which was 530 mg/l. Exhausts were collected in a funnel and passed through a cellulose filter, extracted with HNO_3 and distilled water and then colorimetrically determined. Pb content ranged from 274-404 mg, indicating that after burning 1,000 l. of a gasoline containing 500 mg/l, Pb deposit in the engine of this car would amount to 96-226 g rather than 325-425 g, as demonstrated by the estimation mentioned above. Accordingly, in Switzerland, 165,000 kg of Pb in form of highly poisonous Pb salts are given off yearly by car exhausts. In order to determine how much of the Pb contained in inhaled air is retained in the body, air samples of 100 l. each were taken in the following 3 rooms of a printing establishment: melting room, type foundry and make-up room (used for sawing and planing the Pb). In addition, exhaled air of persons working in these 3 rooms, also as 100 l. samples, was collected in glass tubes and then passed through cellulose filters. It was measured with a gas meter and determined by the nephelometer method, ie, measured as $PbCrO_4$ against buffered chromate solutions of known Pb content, maximum probable error being 2%. The following concentrations of Pb were found in the air of the 3 rooms, in order stated above: 0.009, 0.02 and 0.045 mg. No Pb could be detected in any of the samples containing the respiratory air. It was concluded that all of Pb inhaled with the air is retained in the lungs of the workers. In light of the constant increase of motor traffic, the latter fact is continually gaining importance. It is suggested that use of Pb-containing anti-knock agents represents a growing danger and it is recommended that it be substituted by Pb free agents, such as benzol in the German gasoline BV-Aral.

3251 Khachatryan, M.K. (Erevanskii Med. Inst. USSR): Nakoplenie svintsa v organizme podopytnykh zhivotnykh v svyazi s zagryazneniem atmosfernogo vozdukha. (ACCUMULATION OF LEAD IN THE ORGANISM OF EXPERIMENTAL ANIMALS FROM AIR CONTAMINATION.) Gigiena i Sanitariya 19, No. 1: 12-6, 1955

Air samples taken at distances of 300, 500, 1000 and 2000 m from a non-ferrous foundry showed average values of 0.041, 0.030, 0.0072 and 0.0009 mg Pb/m^3; 0.019, 0.015, 0.0071 and 0.0008 mg Cu/m^3, and 0.350, 0.285, 0.148 and 0.052 mg Zn/m^3, respectively. Soil samples taken from the surface at 250, 500, 1000 and 2000 m distance contained 0.056, 0.018, 0.025 and 0.004% Pb, 0.070, 0.040, 0.042 and 0.015% Cu; and 0.712, 0.197, 0.170 and 0.020% Zn, respectively. Those taken at a depth of 0-0.25 m contained 0.040, 0.026, 0.017 and 0.003% Pb; 0.0053, 0.020, 0.019 and 0.011% Cu and 0.441, 0.130, 0.105 and 0.021% Zn, respectively. Twenty-four rabbits (1.5 mo old) were divided into 4 groups of 6 each. Groups I, II, III were kept within 500 m from the factory for 3 mo, group IV was kept in an uncontaminated area. All animals received fresh tap water 2-3 times daily. Groups III and IV received food grown in uncontaminated area; group II received food grown in the immediate vicinity of the factory but carefully washed before use. Group I received the same food as group II, unwashed. After 3 mo the animals of all groups were sacrificed, and the Pb contents of bones, liver and muscle were determined spectrographically. Compared to the control group IV, the Pb content in these organs had increased as follows: in group III, 3-1/2, 5 and 6 times; in group II, 5, 9 and 9 times; in group I, 20, 18 and 27 times, respectively.

The author concludes that it is evident that most of the Pb had been ingested from the dust on unwashed food, followed by inhalation of contaminated air, and only a minor amount had been obtained from contaminated soil by consumption of food grown on this soil.

1956

3252 Ermilov, V.I.: (RECOVERY OF LEAD DUST FROM AN AIR STREAM BY A WET METHOD.) Uchenye Zapiski Yaroslav. Tekhnol. Inst. 1:111-26, 1956.

It was established that gases after cleaning with electric precipitators contain 1-2.2 g dust/m^3, mainly Pb oxides. On recovery of dust in wet chambers with intensive spraying, the gases discharged into the atmosphere contain 0.1-0.3 g Pb oxide/m^3. The cause of the incomplete recovery of Pb dust is its high degree of dispersion, resulting in adsorption of gases, mainly O, preventing wetting of dust particles. Use of foam-forming wetting agents of the type DB and OP-10 in concentrations double those corresponding to minimum surface tension (correspondingly 0.15 and 0.3%), leads to instantaneous displacement of the adsorbed gas, to complete wetting of dust particles and to recovery of 99.7-99.9% of dust. Addition of a small quantity of Pb acetate to the solutions of wetting agents permits decreasing their consumption to 2/3-1/4 without changing their effectiveness. Film-type equipment is recommended for dust recovery with the aid of wetting agents. Gas-stream velocity, at a 27-30 erg/cm^2 surface tension of the spray solution, should not exceed the value corresponding to Reynolds no. 4800-900, otherwise turbulent flow of gases begins, leading to the breaking of film and foaming of solution. (From Referat. Zhur., Met. 1957, Abstract No. 328; Chemical Abstracts 52:12285, 1958)

3253 Jecklin, L. (Basel, Switzerland: Untersuchungen über den Bleigehalt der Auspuffgase beim Benzinmotor. (STUDIES ON THE LEAD CONTENT OF EXHAUST GASES FROM THE GASOLINE MOTOR.) Archiv für Gewerbepathologie und Gewerbehygiene 14, No. 6:626-30, 1956.

The use of Pb gasoline as motor fuel has been permitted in Switzerland since 1947. The "ethyl fluid," added to the gasoline as an anti-knock agent, contains (in weight %): TEL 63.3, ethylene dibromide 25.8, ethylene dichloride 8.7 and coloring matter 2.2. In both Switzerland and Germany, gasoline contains 0.4-0.6 ml of TEL or 425-640 mg of Pb/1. In addition to soot and gases, the exhausts of cars running on such gasoline also contain $PbSO_4$, $PbBr_2$ $PbCl_2$, $Pb_3(PO_4)_2$ and PbO. Numerous investigations have been carried out in order to determine the Pb content of exhaust gases.

In the study reported here, an Austin A-30 car, using 1 l. of gasoline/18 km driving at 50 km/hr, was chosen for a series of 5-min test drives. The amounts of Pb deposited on cellulose filters in a funnel attached to the exhaust pipe was determined colorimetrically with dithizone. The values found for the Pb content of the exhaust gases ranged from 274-404 mg Pb/l of gasoline, the difference being due to the changes in speed. During 1955, a total of 540,978 tons of gasoline was imported into Switzerland. It is calculated that at least 200,000-290,000 kg of Pb have escaped into the air with the exhaust gases in the course of that year. The Pb contents of air samples, taken at various locations, ranged from 5-7 µg/m^3 of air in downtown Basel to 2-4 µg/m^3 of air in a village. None of the samples were found to be completely Pb-free. In dust samples, the following ranges of Pb content were detected: from traces and 0.03 mg Pb out of town to 0.2-1.2 mg Pb/g of dust in downtown Basel. If each gram of dust, having the specific gravity of 1.4, contains 0.6 mg Pb, each m^3 will contain 840 g of Pb. It is stated that the toxic effect of Pb, when taken in through the lungs, is 10-100 times greater than when it is ingested. The minimum toxic dose for human inhalation of Pb has been established at 100 µg/day

It is recommended to discontinue the use of TEL as anti-knock agent, or else to reduce the Pb content of exhaust gases by attaching filters to the exhaust pipes in order to absorb the escaping Pb. (16 references)

3254 Jecklin, L. (Basel, Switzerland): Bleistaub und Lungenkrebs. (LEAD DUST AND LUNG CANCER.) Schweizersche Medizinische Wochenschrift 86:891-2, 1956.

The study reported here followed a publication of an article in a Swiss magazine on the correlation between the presence of exhaust gases and the incidence of lung cancer. Among various views on the subject, in a personal communication, Kehoe stated that there is no relationship between an increase of Pb in the atmosphere and the incidence of pulmonary carcinoma; that Pb compounds have been used in the treatment of cancer; that there are no data indicating that exposure to Pb in industry is accompanied by an increase in the frequency of lung cancer, and that numerous autopsy findings on Pb contents of lungs of persons exposed or nonexposed to Pb show wide ranges, partly due to the difference in analytical methods. Jecklin has analyzed lung specimens from 5 persons who had died of lung cancer and from 5 persons with normal lungs, using the colorimetric method (dithizone) as described by Högl and Sulser. The results demonstrated no differences in Pb contents. The values found (in mg/10 g of fresh tissue) ranged from 0.011-0.018 in the cancerous lungs and from 0.010-0.016 in the normal lungs. The conclusion was drawn that Pb is not a carcinogenic agent.

3255 King, P., Lockhart, L.B., Jr., Baus, R.A., Patterson, R.L., Jr., Friedman, H., and Blifford, I.H., Jr. (Naval Res. Lab., Washington, D.C.): RaD, RaF, AND Po IN THE ATMOSPHERE. Nucleonics 14:78, 80-2, 84 (June), 1956.

Facilities were installed in different parts of the world to collect natural radioactive products from the atmosphere. The quantities of ^{210}Pb, ^{210}Bi, and ^{210}Po in the atmosphere were determined. (From Nuclear Science Abstracts 10:7062, 1956)

3256 Lebedev, Y.D., Nedogibchenko, M.K., and Glebova, L.F.: HYGIENIC SCIENCE AND SANITARY PRACTICE IN PRESERVATION OF CITY ATMOSPHERE. Gigiena i Sanit. 21, No. 11: 3-8, 1956.

The general problems of city air pollution are discussed. The following levels of single maximum and average daily tolerances of contaminants in city air as recommended in USSR are given: S dioxide 0.5, 0.15; Cl 0.1, 0.03; H sulfide 0.03, [illegible] nitrogen 0.3, 0.15; [illegible], 2.0; S oxides 0.5; [illegible] general non-toxic dust 0.5, 0.15; soot 0.15, 0.05; [illegible] 0.15, 0.05, Mn compounds 0.01, [illegible]; P compounds 0.15, 0.05; sulfuric acid 0.3, 0.1; [illegible] 0.3, 0.1; inorganic As compounds [illegible] 0.003, Pb compounds (except [illegible]) [illegible] mg/m³. (From Chemical Abstracts [illegible], 1957)

3257 [illegible], G., and Fontanella, [illegible]: ATMOSPHERIC POLLUTION BY SEVERAL HARMFUL [illegible]. Igiene Mod. (Parma) 49: [illegible], 1956.
A spectrographic method was used for determining trace metals, including Pb. The results show the existence of amounts of these substances which are [illegible] less than the generally accepted tolerable limits. Hypotheses as to possible synergistic action, formation of toxic products of [illegible], etc. are considered. (From Fuel Abstracts [illegible], No. [illegible], 1957; Chemical Abstracts [illegible], 1960)

3258 [illegible], J., and Kašpar, V.: POLLUTION OF THE ATMOSPHERE BY COMPOUNDS OF ARSENIC FROM METALLURGICALLY WORKING UP LEAD ORES. Československá Hygiena 1:[illegible], 1956.
The concentration of suspended dust with high contents of As was determined in the surroundings of metallurgical works processing Pb ores. The potential danger of acute pollution of the atmosphere is discussed. It is pointed out that health disorders in the factory as well as in its surroundings were mainly caused by technical defects in the flue gas cleaning devices. (From Scientific Reports, Institute of Industrial Hygiene and Occupational Diseases, Prague, 1952-56:117)

3259 [illegible], and Bell, [illegible]: FINAL REPORT: LITERATURE REVIEW OF METROPOLITAN AIR POLLUTANT CONCENTRATIONS -- PREPARATION, SAMPLING AND ASSAY OF SYNTHETIC ATMOSPHERES. S R I Project No. [illegible]-1816. Prepared for Chemical Corps Research and Development Command, Biological Warfare Laboratories, Fort Detrick, Frederick, Md., Stanford Research Institute, 1956.
In the 1st phase of the study a literature review and extensive tabulations of measured concentrations of all pollutants found in surveys were to be related to broad class intervals of population and [illegible] to the fuel and industrial economies. Since most studies were planned to deal with specific nuisances, data related to fuel and industrial economies were too few to be statistically representative. Hence a new approach was tried for calculating pollutant component concentrations, using as basic data published statistics on domestic and industrial fuel consumption. Finally, summary tabulations of measured and calculated pollutant concentrations were prepared. These 3 phases are shown in Appendices A, B, and C. In Appendix A, the Pb concentrations ranged from 0.10-42 μg/m³ (based on 40 references). Pb was not included among the substances for which calculations were made. In Appendix C, tables I-III summarize the literature data on measured air pollutant concentrations throughout the world; in tables IV-V, the calculated concentrations for 7 metropolitan areas are given. In table C-III, the average and range of measured particulate air pollutant concentration in metropolitan areas of >2,000,000, 500,000-2,000,000, and <500,000 was found to be: 3.2, 0.23-4.3; 1.8, 0.13-1.8; 0.85 μg/m³ respectively. In table C-VI, the average concentration of Pb in air is shown as 0.0002-0.003 mg/m³. In table C-VII, the average concentration of particulate Pb (maximal loading, [illegible] μg/m³) is given for 3 cities >2,000,000 as 4.6 μg/m³; for 7 cities 500,000-2,000,000, 1.7; for 4 selected small cities, 0.9; and for 3 nonurban areas, 0.4. In addition, a synthetic atmosphere was prepared to test the viability of bacteria on the basis that since "average maximum" concentrations show no detrimental effects on the [illegible] bacteria, it might be assumed that there are no bacteriostatic or bactericidal substances in city air. It is admitted that this approach is not a positive solution of the problem. The "average maximum" of Pb for heavily industrialized areas was 4.3 vs maximum concentrations found in 3 cities, 4.5-42.4 μg/m³. (36 references)

1957

3260 Arkhipov, [illegible] (Inst. Ind. Hyg. Occup. Dis., Gor'ki, USSR): Gigienicheskoe znachenie zagryazneniya atmosfery zavodskikh ploshchadok khimicheskikh proizvodstv. (HYGIENIC SIGNIFICANCE OF POLLUTION OF THE ATMOSPHERE IN CHEMICAL MANUFACTURING AREAS.) Gigiena i Sanitariya 1957, No. 2:22-31.
The area under investigation was characterized by a large number of sources of pollution and by the presence of 2 zones of discharge (the upper and the lower) as well as by a considerable irregularity of discharge of waste products and by the complex nature of air pollutants. The zones with heaviest pollution, for each separate industrial process, were situated differently: 250 m from the source of waste discharge in the production of red and yellow phosphorus, 500 m in the production of concentrated sulfuric acid, and 500-750 m in the production of TEL and ethyl fluid. However, pollutants in the case of TEL manufacture, or inorganic Pb and sulfuric acid were carried 3000 m, in the case of phosphoric acid production, >1500. Tables show the results of analyses in air and in snow for phosphoric acid and S oxides. In the case of TEL manufacture, the concentrations of TEL in the surface layer of snow amounted to an average at 100-m distance of 57.7 mg/m², and in the soil, 152; the corresponding concentrations for inorganic Pb were 4965.2 and 7750. At 3000-m distance, an average of 8.1 and 25 mg TEL/m² was found in snow and soil and 8.1 and 190 mg Pb/m², respectively. TEL content near the inlet of the ventilating duct within the factory was 0.192 mg/m³; at various levels of the platform; at ground level, 0.063 (av), at 6-m height, 0.073, and at 19-21 m, 0.289. In view of these investigations, the author proposes that the MAC of TEL in the air of working premises be set at 0.005 mg/m³ and in the outside atmosphere, at 0.0005; the corresponding concentrations of P compounds should be set at 0.15 mg/m³ (single exposure) and 0.05 mg/m³ average for the day.

3261 Dettling, J. (Univ. Bern, Switzerland): Zur hygienisch-toxikologischen Bedeutung von Bleistaub aus dem Auspuff von mit bleitetraäthylhaltigem Benzin betriebenen Motoren. (THE HYGIENIC AND TOXICOLOGICAL SIGNIFICANCE OF LEAD DUST IN THE EXHAUST OF MOTORS USING FUELS CONTAINING TETRAETHYLLEAD.) Zeitschrift für Präventivmedizin 2, No. 4:140-51, 1957.

See Abstract No. 3248.

3262 Fontanella, E., and Fornasari, E. (Center, Polarographic Studies, Padova, Italy): Metodo polarografico per la determinazione contemporanea di vari metalli nell'aria atmosferica inquinata. (POLAROGRAPHIC METHOD FOR THE SIMULTANEOUS DETERMINATION OF DIFFERENT METALS IN POLLUTED ATMOSPHERIC AIR.) Ricerca Scientifica 27, Suppl. A, Polarografia 3:235-42, 1957.

A polarographic method for the simultaneous determination of Cu, Pb, Cd, and Zn in polluted air is described. The following ranges of concentration, mg x $10^{-3}/m^3$, were determined in samples taken in the environment of chemical factories: Cu 0.25-12, Pb nil-40, Cd nil-15.0, Zn 0.6-27.

3263 Giubileo, M. (Univ. Milan, Italy): Ricerche sull'inquinamento da prodotti di scarico dei veicoli a motore nella citta' di Milano. (INVESTIGATIONS ON AIR POLLUTION FROM MOTOR-VEHICLE EXHAUSTS IN MILAN.) Medicina del Lavoro 48:165-86 (Mar.), 1957.

The CO content in exhaust gases of several motor vehicles was found to range from 0.4-8.4%. Electromicroscopic investigations of the smoke showed the presence of spheric particles of a diameter of 400 mμ that may be related to the presence of Pb. The average CO concentration at central street intersections was 28 ppm, in the center of the city 21 ppm, in the environment of the city center 18 ppm and at the outskirts 0. In 2 tunnels the CO concentration ranged from 20-80 ppm. The Pb concentration in the air was 5.3-7.4 μg/l in the center of the city, 3.6 μg/l at a street intersection near the center, 2.4 μg/l in the outskirts. The Pb content of the street dust was 0.136-0.236% in the central streets, 0.08% in the peripheral streets, 0.048-0.052% at the sidewalks in the center and 0.044% in a courtyard. The amount of Pb on the street surface varied during the day from 1-8.1 mg/m^3. In 3 auto garages 0.8-10.6 mg Pb/m^3 were found and in a testing shed for motor scooters 7.5-17 mg/m^3. In a test performed on 20 urban traffic policemen, the Hb-CO was found to vary from 0-10%, Pb in the blood from 30-65 μg/100 ml, Pb in the urine from 30-85 μg/l (in one case blood Pb was 90 μg and urinary Pb 130 μg), coproporphynuria from 0-3 μg%. (40 references)

3264 Giubileo, M.: Ricerche sull'inquinamento dell'atmosfera cittadina causato dei veicoli a motore. (THE POLLUTION OF CITY ATMOSPHERES CAUSED BY MOTOR VEHICLES.) Revista dei Combustibili 11:157-66, 1957.

See preceding abstract.

3265 Grandjean, E. (Inst. Hyg. Work Physiol. ETH, Zürich, Switzerland): Die Verunreinigungen der Stadtluft. (AIR POLLUTION IN TOWNS.) Zeitschrift für Präventivmedizin 2, No. 1-2:1-19, 1957.

The principal sources are smoke from factories and domestic chimneys, and the automobile exhausts. (As concerns the latter, the composition of gasoline and diesel motor exhausts is tabulated, with traces of Pb being present.) Besides suspended particles, SO_2, aldehydes and N dioxide are the principal substances of practical importance. Their additive action may produce irritation and inflammation of the mucous membranes of eyes and respiratory passages. The level of Pb in polluted air is immediately related to the density of traffic. In crowded streets CO may be present in the air in concentrations of 0.002-0.004%. Of special interest are carcinogenic compounds present in the exhausts of cars. Reference is made to smog disasters (Donora, London). The damage to materials produced by polluted air is pointed out. Preventive measures are discussed. (29 references)

3266 Hirschler, D.A., Gilbert, L.F., Lamb, F.W., and Niebylski, L.M. (Ethyl Corp., Detroit, Mich.): PARTICULATE LEAD COMPOUNDS IN AUTOMOBILE EXHAUST GAS. Industrial and Engineering Chemistry 49:1131-42 (July), 1957.

Studies to determine the amount, composition, and particle size distribution of Pb compounds present in engine exhaust gases were made with laboratory engines and with 2 conventional cars operated on fuels containing TEL. Exhaust carbon and organic particulate matter were not investigated.

About 20-30% Pb burned in the fuel was retained in passenger car exhaust system deposits and lubricating oil, 70-80% being exhausted over 20,000-30,000-mile periods of city and country driving. Pb emission was increased by speed. Under city-type driving conditions (idling, accelerating, decelerating, cruising) Pb recovered from exhaust gas ranged from 20% of Pb burned when the exhaust system was comparatively clean to as high as 60% when the system was heavily deposited after extensive light-duty service. However, under sustained high-speed driving conditions and during high-speed full-throttle accelerations, the amount of Pb exhausted was initially several times lower than that burned but diminished in quantity as the exhaust system became cleaner with continued severe service.

Exhaust particles ranged from 0.01 μ to several mm in diameter. Particles <1μ were more numerous but accounted for <5 weight % of exhausted Pb. Heavy particles (≥5μ) represented ∿27% of exhausted Pb under city-type driving, increasing to ∿30% under accelerating conditions.

Pb was exhausted principally as PbCl·Br, α and β forms of $NH_4Cl \cdot 2PbCl \cdot Br$ and $2NH_4Cl \cdot PbCl \cdot Br$. The amount of Pb exhausted was proportional to the concentration of TEL in gasoline, but particle size distribution and composition were independent of this variable. The quantity of Pb exhausted in particle sizes which might remain suspended in the atmosphere appeared to be reduced by conditions which produce low gas velocities and low temperatures in exhaust systems (ie, design factors such as larger engines and multiple exhaust systems as well as operating factors). That low-speed driving as encountered in congested areas tends to minimize Pb emission, probably explains why analyses of urban air show Pb concentrations which are low in relation to the amount of Pb burned. (From authors' summary; 13 references)

3267 Preis, H. (Federal Inst. Materials Testing and Research, Zurich, Switzerland): Untersuchungen über die Bleigehalte der Luft, verursacht durch bleihaltiges Autobenzin. (INVESTIGATIONS ON THE LEAD CONTENT OF AIR CAUSED BY LEAD-CONTAINING AUTOMOBILE GASOLINE.) Zeitschrift für Präventivmedizin 2, No. 11:397-408, 1957.
The Pb content of the air on various streets of Zurich, Switzerland, ranged from 0.05-4.9 $\mu g/m^3$; in the center of a tunnel it was 18.8 $\mu g/m^3$. The air in 8 garages contained 3.7-37.0 μg TEL/m^3 or 2.7-29.1 μg Pb/m^3. In hangars and shops for planes where tanking was done the air contained 5.5-300 μg TEL/m^3. Dust sediments on rural roads not frequented by motor vehicles contained 0.000-0.018/1000 Pb while settled dust on city roads in 1948 had a Pb content 100 times as large. The Pb content in samples of settled dust collected at 19 different sites in Zurich during 1948-55 ranged from 0.10-7.0/1000. Comparison of Pb content in settled dust showed in 6 samples taken from Zürich streets an average of 1.4/1000, in 15 samples from 7 workrooms, 18.9, in 22 from 11 garages, 16.1, and in 6 from 3 Pb smelters, 303/1000. Three series of tests were made with 6 different persons while the Pb concentration in the air and the respiratory rate were varied. Evaporation of aviation gasoline was used as the exposure. At a Pb concentration in air of from 100-300 $\mu g/m^3$ the average Pb retention in the lungs and respiratory organs at rest was ~58%. During physical work equivalent to 100 watt, retention rose to an average of 68.8%. The results showed that changes in Pb concentrations in air had practically no influence on the degree of retention, but that changes in respiratory rate did.

3268 Rost, R. (Tech. Univ., Berlin-Charlottenburg, Germany): (THE DEPOSITION OF LEAD COMPOUNDS IN COMBUSTION ENGINES OPERATING ON LEADED FUELS.) Deut. Kraftfahrtforsch. Strassenverkehrstech. 1957, No. 106:5-26.
Currently used German automotive fuels contain 0.07-0.08% S and a maximum of 0.06% by volume TEL. During operation Pb-S compounds of low volatility are formed and deposited. Deposits are most tenacious where metal temperatures are high. A microscopic study of the deposits on the cylinder heads and exhaust valves showed the presence of Pb sulfate, Pb oxide, Pb oxide sulfate, smaller amounts of metallic Pb, C, Pb halides and Pb oxyhalides, occasionally Pb sulfide and more often Pb thiosulfate. The Pb compounds were found in layers that alternated with C layers. If Pb and S compounds are entrained as dusts in the combustion air, and a nonleaded gasoline containing 0.02% S is used, these compounds are preferentially converted to Pb sulfate as the final product of a sequence of reactions. Fuels of different origins did not differ in their tendency to form deposits; however, deposition increased with an increase in the boiling range of the fuels. (From Chemical Abstracts 56:1669, 1962)

3269 Tipikin, G. (City of New York Dept. Air Poll. Control, N.Y.): A CRITICAL REVIEW OF TWO RECENT RUSSIAN BOOKS ON AIR POLLUTION. Journal of the Air Pollution Control Association 7:227-33 (Nov.), 1957.
The following 2 books are reviewed: (1) Ryazanov, V.A.: Sanitary Safeguard of Atmospheric Air. Moscow, 1954; (2) Maximum Allowable Concentration of Air Pollutants. Ed. Ryazanov, V.A., Moscow, 1955. The author proposes to establish limits for maximum single exposure besides limits for average daily concentrations of pollutants in air. He also points out that adaptation to a poison does not mean that its harmful effect on the organism has ceased. Limits should be set according to the most sensitive index, ie, if a gas can be detected at concentrations below the toxic threshold, limits should be established according to the threshold of sensory perception. SO_2 and Pb contamination is discussed in particular. The maximum average allowable concentration of Pb in air approved by the All-Union State Sanitary Commission is 0.7 $\mu g/m^3$. This figure is based on a MAC in drinking water of 0.1 mg Pb/l or 0.2 mg/day. Assuming that man inhales 15 m^3 air/24 hr, the safe concentration of Pb (by calculation) would be 0.013 mg/m^3. However, since inhaled Pb is more harmful than oral Pb, this figure must be reduced by at least 20 times, ie, to 0.65 $\mu g/m^3$. Threshold industrial limit values for a number of contaminants are tabulated. In measuring the dust content of air, the author does not recommend konimetric methods since he maintains that the harmful effect of dust is proportional to the mass of dust that penetrates into the organism and not to the number of particles. Therefore, concentration by weight in mg/m^3 and distribution of the particles should be measured, and MAC's of dust in air must be expressed in mg/m^3 for various fractions of dust (size of dust particles). The author objects to the method of sedimentation for testing air because man is exposed to the effect of suspended particles and not to those that settled on the ground. In the USSR restricted zones from 1000-50 m are established around industrial enterprises and no new plant may start operation without a permit from the State Sanitary Control which tests its purifying installations. (14 references)

3270 Zan, E.: (DATA ON THE MELTING OF FAGGOTED SCRAP IN THE SIEMENS-MARTIN FURNACE AND THE ZINC- AND LEAD-CONTAINING SMOKE PRODUCED.) Radex Rundschau 1957, 476-81.
Data are reported on the melting process occurring in a 30-ton Siemens-Martin furnace charged in part with faggoted scrap. The causes of the prolonged fusion process and the increased consumption of crude Fe are to be found in the smoke issuing from the furnace. Among the 17 metal-oxides contained in dust taken from the waste-heat boiler, 7.29% PbO was present. When the scrap is introduced at the end of the run, during the slow melting, an intensive oxidation of nonferrous metals occurs, especially of Pb, Sn, Sb, Cu, and Zn. These oxides are carried off in the gas current, while the oxides of the nonvolatile

metals are taken up by the slag present. (From E.Zar. Radex Rundschau 1957, 476-81; Chem. Zentr. 129, 248, (1950); Chemical Abstracts 53:19751, 1959)

3271 Zykova, A.S. (Moscow Reg. San. Hyg. Inst.): POLLUTION OF ATMOSPHERIC AIR WITH LEAD AND ITS EFFECT ON THE HEALTH OF THE POPULATION. Gigiena i Sanitariya 22, No. 2:12-7, 1957. In Levine, B.S.: U.S.S.R. Literature on Air pollution and Related Occupational Diseases. Washington, U.S. Department of Commerce, Office of Technichal Services, 1960, Vol. 1, pp. 55-62.

The total daily discharge of Pb from a storage battery plant, equipped with precipitators, was 5.7 kg; from a Pb smelter, 14.7 kg. Contamination of snow with Pb over a distance of 1000 m from the Pb smelter was 10 times higher than from the storage battery plant: 25.8 mg/m^2 vs 2.56 mg/m^2. The chromate micromethod (Polezhaev) was used for determining Pb in air. Air samples from the vicinity of the storage battery plant showed in summer maximum daily averages of 0.0041, 0.003, 0.0023 and 0.0031 mg Pb/m^3 at distances of 100, 300, 500 and 700 m, respectively. Samples collected in the area of the Pb smelter gave the following maximum daily averages, in mg/m^3, in summer, autumn, and winter, respectively: at 100 m, ----, 0.0021, 0.027; at 250-300 m, 0.018, 0.0034, 0.039; at 500 m, 0.0048, 0.0022, 0.017; at 700 m, 0.0053, ----, 0.015; at 900-1000 m, 0.016, ----, ----; at 1500 m, ----, ----, 0.0041.

Twenty-one dust samples of 29 analyzed from dwellings in the vicinity of the Pb smelter showed presence of Pb, ranging from 0.012-0.03%. The artesian wells, used as water sources, contained up to 0.0019 mg Pb/1. Four hundred four persons (18-50 yr old and residents for >2 yr) living within 1000 m of the Sn foundry and 147 persons as controls from a distant area were examined. The total incidence of disease in these 2 groups was 136.2 and 46.3%, respectively, falling into the following categories: respiratory, 12.4 and 16.9%; nervous system, 50.2 and 6.3%; cardiovascular system, 38.9 and 19.3%; digestive system, 34.7 and 3.9%, respectively. Urine samples were taken from 78 persons (no data) living in the contaminated area and from 15 controls. Sixty-six samples of the first group contained 0.01-0.2 mg Pb/1 (25 of these showed 0.1-0.2 mg Pb/1). The control samples showed physiologically normal values (0.03-0.04 mg/1). Four cats maintained within 100-200 m distance from the Sn smelter (where air contained av 0.0021-0.027 mg Pb/m^3) for 2, 3, 4 and 7 yr and a control (4 yr) showed the following Pb content in tissues: tibia, 120, 180, 1000, 2000 and 20 mg/kg; femur, 200, 260, 880, 1640 and 10 mg/kg; brain, 300, 400, 140, 200 and (-) mg/kg; kidney, 65, 125, 120, 70 and 30 mg/kg; liver, 175, 90, (-), 150 and 70 mg/kg, respectively.

It is recommended that better controls be instituted for the removal of Pb from effluents; that new construction and improvement of dwelling units in a radius of less than 100 m from Pb smelters be forbidden; and that a zone of tall-growing trees be planted around the factory.

1958

3272 Bersin, T.: Prophylaxe und Therapie der larvierten Bleivergiftungen durch bleihaltige Kraftstoff-Abgase. (PROPHYLAXIS AND THERAPY OF LATENT LEAD POISONING RESULTING FROM LEAD CONTENT IN VEHICULAR EXHAUST GASES.) In Nückel, H.: Neue Ergebnisse der Aerosol Forschung, Stuttgart, 1958, pp. 380-6.

Hazards resulting from the Pb content in exhaust gases are discussed. (From APCA Abstracts 5: 2475 (June), 1959)

3273 Chambers, L.A. (Los Angeles, Calif.): TRANSPORTATION SOURCES OF AIR POLLUTION. 1. COMPARISON WITH OTHER SOURCES IN LOS ANGELES. Proceedings National Conference on Air Pollution, Washington, D.C., Nov. 18-20, 1958, pp. 167-70.

Although vehicular exhausts are a major source of air pollution, it is not possible to conclude that equivalent amounts of pollutant losses will produce equivalent effect in all cities. This is due to differences in topographical and climatical situations.

It is stated that the use of 1000 gal of gasoline releases 0.3 lb of solids, which is a mixture of Zn, Pb, other metallic oxides and C or that every 1000 operating automobiles emit daily 0.6 lb of this mixture. This serious community problem will be brought to an end when a means for substantially eliminating some constituents of the exhaust is put to effective use.

3274 Effenberger, E. (Inst. Hyg., Hamburg, Germany): Gefährdung der Beamten des Passkontroll- und Zolldienstes an Grenzübergängen durch Auspuffgase. (HAZARDS TO PASSPORT AND CUSTOM OFFICIALS AT BORDER AREAS FROM EXHAUST GASES.) Zeitschrift für Hygiene und Infektionskrankheiten 145:403-21, 1958.

The elaborate study described in this paper was undertaken because passport and customs officers had complained of symptoms at rush hours which they attributed to exhaust gases from the running engines of stationary motor vehicles. Sections of the paper deal with: (1) The toxic constituents of exhausts from petrol and Diesel engines which include CO, N gases and aldehydes (a description from the literature of the clinical effects of these and of Pb dust from ethyl fluid is given); (2) the movement of exhaust gases under different meteorological conditions; (3) the symptoms complained of by officers at 2 frontier stations between Germany and Switzerland (a long list of complaints of the officers and their frequency is given and the most important were headache (48%), a feeling of oppression in the gastric region (8%); (4) the traffic concentration at different periods; (5) measurement of the CO concentration in the air; (6) the association of traffic density and CO content (this was examined at length by statistical methods); (7) statistical examination of the relation between frequency of symptoms and the traffic concentration and also the velocity of the wind; (8) the CO content of the blood of the officers, which was found to increase during work periods.

From the results of the study there is considered to be no doubt that the officers at these 2 frontiers are endangered by exhaust gases at times of heavy traffic and when the air is still. Some recommendations are made for lessening this danger which arises not only from CO but also from other constituents of the exhaust.

3275 Fatzer, R. (Wädenswil, Switzerland): Gift in der Atemluft. (POISON IN THE RESPIRATORY AIR.) Schweizerische Apotheker Zeitung 96, No. 21:418-20, 1958.

Author demonstrates the danger of Pb poisoning in everyday life. He reasons that since man ingests with his food about 200 µg Pb/day, the Pb content in air should not exceed 12.5 µg/m^3, considering the fact that the inhaled portion of Pb is 10-100 times as toxic as the ingested. He claims that due to the use of leaded gasoline the limit of tolerance has been generally reached and that for instance in automobile repair shops it is often considerably exceeded. He states that in Switzerland 300,000 kg Pb are thrown into the air by motor vehicles every year. Although according to authoritative statements no signs of Pb poisoning have yet been noted, he questions whether the increase of certain diseases which has been attributed to different causes, may not be a sign of chronic Pb poisoning. In discussing the fouling of the air in Los Angeles the author calculates that at a daily discharge of 10 tons of Pb into the city air a yearly amount of 360 m^3 Pb is discharged which corresponds to a "cube with sides 7 m long." In view of all facts Pb should no longer be considered as a trace element. (29 references)

3276 Getskin, L.S., Batyuk, A.G., Tsyb, P.P., Savraev, V.P., Gorokhvodatskaya, R.I., and Zinov'ev, V.P.: (TREATMENT OF LEAD SMELTER DUST BY SULFATION.) Sbornik Nauch. Trudov, Vsesoyuz. Nauch.-Issledovatel Gorno-Met. Inst. Tsvetnykh Metal. 1958, No. 3:44-68.

A new method of sulfating pulverulent material was developed based on granulation of dust followed by sulfation of the granules. The behavior of various elements in the granulation and sulfation of Pb production dusts was investigated. (From Chemical Abstracts 54:18236, 1960)

3277 Giovanardi, A. (Univ. Milan, Italy): Finalità del Convegno sui metodi di studio degli inquinamenti atmosferici da prodotti delle combustioni domestiche e industriali e da scarichi dei veicoli a motore. (PURPOSE OF THE CONFERENCE ON METHODS OF STUDYING ATMOSPHERIC POLLUTION FROM DOMESTIC AND INDUSTRIAL COMBUSTION PRODUCTS AND MOTOR VEHICLE EXHAUST.) Minerva Medica 49:953-6 (Mar.), 1958.

A very general discussion of atmospheric pollutants and the possible presence of Pb as combustion product from motor vehicles is presented.

3278 Goossens, J.F., and Lafontaine, A.: La pollution chimique de l'air dans les cités modernes et le problème particulier des gaz de combustion des moteurs à explosions et des installations de chauffage. (CHEMICAL POLLUTION OF THE AIR IN MODERN CITIES AND THE PARTICULAR PROBLEMS OF GAS FROM COMBUSTION ENGINES AND FROM HEATING INSTALLATIONS.) Archives Belges de Médecine Sociale, Hygiène, Médecine du Travail et Médecine Légale 16:217-37 (May), 1958.

Atmospheric pollution originating from industrial and domestic sources, including radioactive material from nuclear explosions or power stations and carcinogenic substances in the air, is discussed. Concentrations of such contaminants as CO, Pb and SO_2 in modern cities in the US and Europe, their irritating effects and possible measures of prevention are reviewed. The composition of motor exhaust gases is dealt with in detail. An extensive bibliography is included and a table listing the maximum allowable concentrations of toxic substances as published by the 16th Conference of Governmental Industrial Hygienists is presented.

3279 Grünvald, A., and Barth, A.: Naše dosavadní zkušenostis použitím ethylovaného benzinu k pohonu motorových vozidel po stránce hygienické. (EXPERIENCE WITH TETRA-ETHYL LEAD FOR CARS, FROM THE HYGIENIC ASPECT.) Pracov. Lek. 10, No. 4:346-8, 1958.

The authors investigated garages for the concentration of Pb in the atmosphere due to the use of TEL gasoline. The average Pb concentrations found ranged from 0-1.32 mg/m^3, the admissible concentration of Pb, 0.05 mg/m^3, was surpassed 5-10 times. The state of health was not influenced by the use of TEL gasoline. Simultaneously high values of CO which surpassed the MAC 3-13 times were found. Although so far no adverse effect on the state of health has occurred it will nevertheless be necessary to require perfect ventilation of garages to keep the concentration of Pb and CO within permissible limits. (From Excerpta Medica, Sect. 17, 5:Abstr. No. 2095, 1959)

3280 Högger, D. (Natl. Board Ind., Trades, Labor, Zürich, Switzerland): Die Tätigkeit der eidgenössischen Bleibenzinkommission von 1947 bis 1957. (ACTIVITY OF THE SWISS LEADED GASOLINE COMMISSION FROM 1947 TO 1957.) Zeitschrift für Unfallmedizin und Berufskrankheiten 51, No. 2:150-7, 1958.

A Commission was set up by the Department of the Interior in Switzerland in 1947 to study the effects of TEL, officially permitted to be added in specified amounts to motor fuel in 1947, on the health of those who worked with the gasoline and on the health of the general population. Certain regulations were first introduced and these included general precautions in garages and in the storage of the Pb-gasoline. Gas containing TEL must be colored and its containers must be specially marked. Its use for any other purpose than as motor fuel was prohibited. A number of investigations relating to the subject have been carried out and reports on several of these have been published. Reports of these studies are given in this paper with tables of results. The data so recorded are the TEL content of various motor fuels in different years, the Pb content of exhaust gases, the Pb content of the air, the extent to which Pb in air or dust is retained in the lungs when inspired, the daily intake of Pb from food or water or inhalation of dust and gases and the Pb content of the blood of medical students, garage personnel and workers in Pb trades.

The conclusion reached by the Commission, to whom all cases of suspected TEL poisoning have to be reported, is that no danger from the Pb was established except in isolated cases in workers with airplane fuel, which contains much more TEL than does the auto gasoline.

In the discussion which followed the presentation of the report the opinion based on it was that at present in Switzerland there was no Pb risk and that, judging by the experience of other countries, it was unlikely that a dangerous concentration of Pb in the atmosphere would be built up. Nevertheless, the continuation of control measures is essential. Some doubts about the safety of the present state of affairs and anxiety about the future were, however, also expressed.

3281 Morriss, F.V., Bolze, C., and Goodwin, J.T., Jr. (Midwest Res. Inst., Kansas City, Mo.): SMOG CHAMBER STUDIES OF UNLEADED VS. LEADED FUELS. NEITHER TETRAETHYLLEAD NOR HALOGEN-CONTAINING SCAVENGERS OF LEAD HAVE ANY DETECTABLE EFFECT ON THE SMOG-FORMING POTENTIAL OF AUTOMOBILE EXHAUST. Industrial and Engineering Chemistry 50:673-6 (Apr.), 1958.

As automobile exhaust gas has been implicated as a major source of smog-producing chemicals, the effect of TEL and halogen scavengers used in antiknock fluids was investigated. Experiments were carried out in 2 large reaction chambers equipped with air-sampling systems, on 3 fuels, with and without antiknock addition. The schedule for sampling and testing included physiologic measurements in the form of eye irritation. The 1st was measured by sending 1 or 2 persons, from a panel of 20, into each chamber at 9-min intervals. They stayed there 2 min, then indicated their reaction on a questionnaire. Typical smog symptoms were found throughout the experiments. Levels of eye irritation ranged from zero to severe and large amounts of oxidants were formed, ~40 pphm after 20 min. The average levels of eye irritation were low. Statistical evaluation of the data from 48 individual runs showed no significant differences as to eye irritation, aldehyde concentration, and rubber cracking, as well as oxidant, hydrocarbons, CO and NO's for the 3 chambers. The authors conclude that additions of TEL to gasoline do not contribute materially to the Los Angeles smog problem.

3282 Nedogibchenko, M.K. (USSR Ministry of Health): PRESENT DAY CONDITIONS OF ATMOSPHERIC AIR POLLUTION BY AUTOMOBILE EXHAUST GASES IN CITIES AND PROBLEMS OF ITS CONTROL. Gigiena i Sanitariya 23, No. 8: 6-9, 1958. In Levine, B.S.: U.S.S.R. Literature on Air Pollution and Related Occupational Diseases. Washington, U.S. Department of Commerce, Office of Technical Services, 1960, Vol. 3, pp. 195-9.

In connection with the planned increase in motor vehicles (6th 5-yr plan: 1956-1960) the problem of air pollution in cities compels serious attention. With CO, soot, tarry substances containing carcinogenic components (eg, 3,4-benzpyrine), N-oxides, and TEL-containing gasoline, Pb compounds are emitted.

The data obtained on CO are first presented and discussed. It was noted that concentrations found in city streets were such that CO pollution violated the sanitary living conditions of the population, and caused changes in blood composition, heacaches, vertigo, weakness, etc. The suggested MAC should not exceed 6 mg/m^3 in single tests and 2 mg/m^3 in av 24-hr tests. Concerning Pb, tests showed that Pb deposited in the motor amounts to 63% and the remainder escapes with the exhaust gases. In burning 1 kg Pb gasoline an idling GAZ-51 motor discharged 0.3 g Pb; at a speed of 15 km/hr, 0.87 g and at 40 km/hr, 0.92 g. Results of an investigation carried out in Sverdlovsk showed that Pb content in exhaust gases ranged from 0.069-3.70 mg/m^3, in streets with heavy motor traffic Pb concentration in air exceeded the MAC of 0.0007 mg/m^3. Pb was detected in water used by traffic police for washing hands, on outside and inside surfaces of windows and windshields of automobiles. Large quantities of Pb were found on leaves of shrubs and trees (up to 15.5 mg/m^3). In an investigation carried out in Moscow, from 0.001-0.003 mg/m^3 was found in street air. Improvements of air condition and prevention of further pollution are suggested, such as improvements in motors, strict inspection of engines, and discontinuance of use of TEL.

3283 Pakhotina, N.S. (Sanit.-Epidemiol. Station E. Kazakhstan, USSR): Sanitarno-gigienicheskaya otsenka promyshlennykh vybrosov svintsovo-tsinkovogo kombinata. (SANITARY-HYGIENIC EVALUATION OF INDUSTRIAL WASTE DISCHARGES FROM A LEAD-ZINC PLANT.) Gigiena i Sanitariya 23, No. 4:3-6, 1958. In Levine, B.S.: U.S.S.R. Literature on Air Pollution and Related Occupational Diseases. Washington, U.S. Department of Commerce, Office of Technical Services, 1960, Vol. 3, pp. 93-7.

The SO_2, Pb and As content of air, soil and vegetation in the neighborhood of a Pb-Zn plant were determined. The atmospheric pollution of Pb (mg/m^3) in leeward direction at a distance of 150-5,000 m from the plant averaged from 0.1212-0.0068. The corresponding values for SO_2 were 4.63-1.01 and for As, 0.062-0.008, respectively. Air-dried loam soil in a distance of 500-16,000 m from the plant, at a depth ranging from 0-25 and 75-100 cm contained 4.1747-0.0778 and 0.0748-0.0292 mg Pb/100 g. For SO_2, 148.11-22.86 and 10.76-4.24 was found, and for As, 1.882-0.305 and 0.196-0.007 mg/100 g. Author recommends measures for abatement of pollution.

3284 Rogers, D.T., and Jonach, F.L. (Esso Res. Eng. Co., Linden, N.J.): MECHANISM OF INTAKE-VALVE UNDERSIDE DEPOSIT FORMATION. Society of Automotive Engineers Preprint No. 106C, 1958, 25 pp.

Laboratory and field studies showed that, in recent model passenger car engines, the deposits are derived both from the fuel and the lubricant. From the use of TEL gasoline, the deposits contain Pb and halogen derived from reactions in the intake system, from blowback of the combustion chamber, and from fuel residues carried by the crankcase lubricant. Multigraded lubricants prepared from low-viscosity base stocks and containing viscosity index improvers have a higher rate of deposit formation than conventional lubricants. The main sources of deposits are apparently the high-temperature oxidation products of the lubricating oil base stock, and the amount of deposit formed is a function of the amount of lubricant reaching the valve underside area.

3285 Serruys, M. (Natl. Conservatory of Arts and Trades, France): Faits et chiffres concernant les substances nocives des gaz d'échappement des véhicules automobiles et en général des moteurs à combustion interne. (FACTS AND FIGURES CONCERNING TOXIC SUBSTANCES IN THE EXHAUST GASES FROM AUTOMOBILES AND INTERNAL COMBUSTION MOTORS IN GENERAL.) Revue de Pathologie Générale et de Physiologie Clinique 58:239-47 (Feb.), 1958.

It is stated that the maximum weight of TEL in the exhaust gases/10 kg burnt fuel amounts to 7.2 g; other components are CO_2 31.15, CO 19.83, hydrocarbon 10.0, and SO_2 0.2 kg; Br 3.35, Cl 2.36, P 0.147 g. Detailed data are given for gasoline and diesel motors. Possibilities for the reduction of quantities of toxic products in the exhaust gases, and what the driver can do to avoid pollution within the vehicle and of the ambient air are discussed.

3286 Weichardt, H. (Frankfurt/M, Germany): Gesundheitsgefahren durch Abgase und die gewerbehygienischen Massnahmen zur Reinerhaltung der Luft. (HEALTH HAZARDS DUE TO EXHAUST GASES AND SANITARY MEASURES FOR THE PURIFICATION OF AIR.) Zentralblatt für Arbeitsmedizin und Arbeitsschutz 8:234-42 (Oct.), 1958.

The Pb content of exhaust gases in Basel (according to Jecklin), was found to be 2-7 $\mu g/m^3$ of air. Since the Pb level in the blood of the population is constantly increasing, it is proposed to use harmless antiknock agents. The author discusses various types of equipment to measure the exhaust from various sources, so that measures can be taken to prevent intoxication of man, animal and plant.

1959

3287 Bersin, T.: Enzymgifte der Autoabgase. (ENZYME POISONS OF AUTO EXHAUST GASES.) Vitalstoffe (Hannover) 3:160-5, 1959.

TEL and inorganic Pb are known to have an inhibiting effect on enzyme actions. The unconsumed gasoline in auto exhausts contains unsaturated hydrocarbons tending to produce smoke and aerosols of Pb compounds. The question is raised whether the absence of an increase in reports of toxic effects from Pb compounds, while traffic density continues to increase, may be due to unsuitable diagnostic procedures. Central nervous system damages after exposure to TEL have been reported to appear 14 yr after the original accident. Other known toxic substances found in automobile exhaust gases are CO and 3,4-benzpyrene. CO is known to block Fe-containing enzymes and produce a decline in performance; 3,4-benzpyrene has been suspected to be at least partially responsible for the increased incidence of pulmonary cancer in town populations. Among the unsaturated hydrocarbons in unburned gasoline are the olefins which under specific atmospheric conditions react with the ozone of the air to produce the olefin ozonides, which are said to block enzymatic action because of the deflection of the active group. Technical measures are needed to control air pollution, including better utilization of gasoline to leave less unburned fuel, and the use of catalysts to combat pollution with olefins. It would also seem possible to exchange the Pb-containing antiknock compounds in gasoline with other compounds. (From APCA Abstracts 5:2551, 1959).

3288 Cannon, W.A., and Welling, C.E. (Ford Motor Co., Dearborn, Mich.): VANADIA-ALUMINA CATALYST FOR THE OXIDATION OF EXHAUST HYDROCARBONS. S.A.E. (Society of Automotive Engineers) Preprint 29T, 1959, 24 pp.

The nature and composition of Pb accumulation on the catalyst bed and in the catalyst are among the problems studied in experiments with a Ford converter. Pb reacts with P pentoxide to form complex compounds resulting in a slow, cumulative, and nonuniform deactivation of the catalyst bed, but the average activity remained for a considerable time on a level comparable to that after 10,000 miles of test run. (From Chemical Abstracts 55:862, 1961)

3289 Gusev, M.I. (Ryazansk Med. Inst., USSR): Vliyanie malykh kontsentratsii svintsa na porfirinovyi obmen u detei. (THE EFFECT OF LOW LEAD CONCENTRATION ON THE PORPHYRIN METABOLISM IN CHILDREN.) Gigiena i Sanitaria 24:6-9 (July), 1959.

Pollution of air with Pb was measured around a cable manufacturing plant and a tin works. Results of 33 around-the-clock collections at 200-400-m distance from Plant 1 showed concentrations from 0.56-1.93 $\mu g/m^3$, with an average of 1.02 µg, thus more than the MAC. Near Plant 2, concentrations ranged from 1.39-3.61 $\mu g/m^3$ (32 samples), with an average of 2.53. A control area showed averages of 0.007 $\mu g/m^3$. Porphyrin excretion was studied in 5-7-yr-old children. The control children (100) excreted daily 2.03-11.05 or an average of 6.5 µg coproporphyrin/8 hr; those near Plant 1 (100) 3.38-15.80, av 8.2 µg (in 18.9%), and those near Plant 2 (111), 3.87-31.07, av 10.5 µg/8 hr. The latter increase occurred in 42.3% of the children.

3290 Hargrave, J.H.D., and Snowball, A.F.: RECOVERY OF FUME AND DUST FROM METALLURGICAL GASES AT TRAIL, BRITISH COLUMBIA. Can. Mining Met. Bull. 52:359-65; Trans. Inst. Mining Met. 62:180-5, 1959.

The processes used for the treatment of waste gases ($\sim$900,000 ft^3/min) from Cominco's operations are listed. Recovery of >99% of the fume and dust is achieved. The plants treat Zn concentrates, Pb concentrates, and ores to produce refined Zn and Pb primarily, also Ag, Au, Cd, Bi, In, antimonial Pb, and Cu materials. The processes are chemical, electrochemical, and pyrometallurgical, the last involving the use of dryers, roasters, blast furnaces, fuming furnaces, reverbatory smelting and melting furnaces, kettles, and electric melting furnaces. (From Chemical Abstracts 53:17392, 1959)

3291 Horiuchi, K., Horiguchi, S., Yamamoto, K., and Takeuchi, I.: DISTRIBUTION OF LEAD IN THE ATMOSPHERE OF OSAKA CITY. Osaka City Medical Journal 5, No. 2:129-34, 1959. In Contributions from the Department of Preventive Medicine and Public Health, Osaka City University Medical School, Vol. 2, April 1959-March 1961, pp. 215-9.

Surveys were performed in Jan.-March 1955 and March-June 1956, with 44 samples collected in the residential and factory (non-Pb) districts and main streets of Osaka from 10 AM-5 PM. Collection was by Greenburg impingers, and carried out at a rate of 30 l/min for ~30 min. Pb analysis was by a modified polarographic method. On one of the main streets, the number of passenger cars, motor lorries and small vehicles were counted according to the classification of traffic statistics by police. The medians, the upper and lower limits of Pb content in air were tabulated; the medians, in $\mu g/m^3$ were: residential districts, 4.5; non-Pb factory area, 9.4; main streets, 10.2; same with dense traffic, 36.4; average, 16.4. The relationship between Pb in air and the number of passing motor cars during sampling ranged from 18.6 $\mu g/m^3$ from 336 cars to 54.5 $\mu g/m^3$ from 468 cars. From the results, the authors calculated the Pb intake from the air as follows: by supposing that the volume of inspired air by an adult/day is 10 m^3, the Pb inspired would be 16.4 x 10 μg; since about 1/2 of it may be retained in the body, the daily Pb intake from city air in Japan can be estimated at ~82 ug/day. (17 references)

3292 Kawabata, Y.: (OBSERVATION OF ATMOSPHERIC DIFFUSION AT TŌKAI-MURA.) J. Atomic Energy Soc. Japan 1:330-9, 1959.

Atmospheric diffusion was observed at Tōkai-mura by measuring the diffusion of PbI_2 from a stack 65 m in height. The results were found in good agreement with theoretical calculations. (From Nuclear Science Abstracts 14: Abstract No. 3255, 1960)

3293 Lampert, F.F. (Moscow Mun. San.-Epidemiol. Station): EFFECT OF GARAGES AND FILLING STATIONS LOCATED IN RESIDENTIAL SECTIONS ON HEALTH AND LIVING CONDITIONS. Gigiena i Sanitariya 24, No. 3:74-6, 1959. In Levine, B.S.: U.S.S.R. Literature on Air Pollution and Related Occupational Diseases. Washington, U.S. Department of Commerce, Office of Technical Services, 1960, Vol. 4, pp. 161-4.

Investigations of selected Moscow residential properties indicated that of 1042 garages located in this area and housing up to 10 automobiles, 66% were distributed contrary to the sanitary clearance regulation and 40% were in the immediate proximity of children's and medical institutions. While of itself this would affect the sanitary living conditions of the population, the progressive change to TEL-containing gasoline imparts to this problem a more serious aspect. It was also found that in nearly all cases the garages occupied a considerable part of the backyard, thus presenting a constant danger to children's safety, and that the exhaust gases penetrated into the apartments; windows were also coated with resinous substances. In the investigation described, CO was determined in the air of garages, near the filling station, in the air of apartments facing the filling stations and garages, and compared with findings in apartments in the same building, but facing in the opposite direction. To eliminate the possible effect of household gas appliances, the latter were shut during sampling. The greatest number of samples with CO >0.03 mg/l was found near the gasoline pump and in apartments located 18 m from the pump. A study of the Pb oxide content in the air was conducted before the city transport changed over to TEL gasoline. As determined by the sedimentation method in 204 air samples, the highest percentage of samples with Pb >0.1 mg/m^2 in 24 hr was found among those collected on a busy highway and near a filling station. It was assumed that the Pb issued from cars using TEL-gasoline. The finding of Pb in the air of nearby garages and apartments (values are not indicated) was attributed to repair work using Pb-containing solders. The author concludes that the heavy pollution in apartments indicates the necessity of enforcing the regulation that filling stations be located at prescribed distance from living quarters.

3294 Morik, J., and Morlin, Z.: Ipari települések levegöjének fémszennyezödése. (POLLUTION OF THE AIR OF INDUSTRIAL REGIONS BY METALS.) Népegészségügy (Budapest) 40:288-93 (Nov.), 1959.

Spectroscopic studies were made of sedimented dust collected over 3 city areas (Miskolc, Györ, Pécs). It was determined that the air was polluted by the following substances: Si, Fe, and Al in amounts >10%; Ca, Cu, Mg, and Na, 0.1-1.0%; Ba, Co, Hg, Mn, Pb, Sb, Zn, Sn, and U, 0.001-1.0%. The amounts of trace metals in the air of each area manifested great variations. (From APCA Abstracts 6: Abstract No. 3417, 1960)

3295 Portheine, R. (Hyg. Inst., Ruhr Region, Gelsenkirchen, Germany): Luftverunreiningungen in unseren Strassen durch Autoabgase. (POLLUTION OF AIR IN THE STREETS BY EXHAUST GASES OF MOTOR VEHICLES.) Therapiewoche 9, No. 7:348-55, 1959.

The various orographical and topographical parameters which have an unfavorable effect on the mass-exchange of the exhaust gases are pointed out. In 1957, 3.5 million tons of gasoline and 3.5 million tons of diesel oil were burned to provide power. The problem of exhaust gases is definitely not a problem of CO, since in homogenous masses of air under unfavorable conditions only values of 1/3 to 1/4 of the MAC value of CO were demonstrated at points where the traffic was densest. Attention must be paid to effects of combined poisons and enzymatic damage. Personal studies on the amount of Pb in samples of grass from the highways yielded values that must be checked in various countries. The values ranged from 15,000 μg of Pb/100 g of grass at the start of the growing period to 100,000 μg of Pb/100 g of older grass. Pb is an enzyme poison. (From Excerpta Medica, Sect. 17, 6:Abstr. No. 1628, 1960)

3296 Shalamberidze Yu.P. (Ministry of Health, Georgian S.S.R.): THE DETERMINATION OF LIMITS OF ALLOWABLE CONCENTRATION OF LEAD SULFIDE IN ATMOSPHERIC AIR. Gigiena i Sanitariya 24, No. 3:9-14, 1959. In Levine, B.S.: U.S.S.R. Literature on Air Pollution and Related Occupational Diseases. Washington, U.S. Department of Commerce, Office of Technical Services, 1960, Vol. 4, pp. 154-60; also in Ryazanov, V.A., ed.: Limits of Allowable Concentrations of Atmospheric Pollutants, Book 5, translated by B.S. Levine. Washington, U.S. Department of Commerce, Office of Technical Services, 1962, pp. 29-38.

Limits of allowable Pb sulfide concentrations were developed on the basis of determinations of actual concentrations present in the air around a Pb ore concentrating plant and studies of the effect of exposure to Pb sulfide in laboratory animals. The concentrations of Pb ranged from 18.8 $\mu g/m^3$ at a distance of 250 m to 1.3 $\mu g/m^3$ at 500 m; the concentrations of Pb-containing dust, from 1.24 $\mu g/m^3$ at 250 m to 0.69 $\mu g/m^3$ at 500 m. Distribution of the Pb sulfide was found to be influenced by wind velocity and direction, as well as by atmospheric precipitation. Analysis of Pb ore concentrate dust showed that its toxic component was Pb sulfide.

Rats exposed to 48.3 $\mu g/m^3$ of ore dust 6 hr/day for 6 mo exhibited conditioned reflex shifts, which differed with the typological characteristics of the rat's higher nervous activity pattern. No shifts in higher nervous activity were observed in rats exposed to 13.5 $\mu g/m^3$ of Pb sulfide. Brain tissues of exposed rats showed the presence of dystrophic changes in isolated ganglia cells. No changes attributable to Pb poisoning were seen in internal organs or blood. It is suggested that the allowable 24-hr concentration of Pb sulfide be set at 1.7 $\mu g/m^3$ and that the Pb ore concentration plant be surrounded by a sanitary clearance zone not <500 m wide.

3297 Suzuki, Y.: (STUDIES ON SELENIUM POISONING. I. EFFECTS OF EXPOSURE TO AIR POLLUTION ON THE COMMUNITY HEALTH IN THE NEIGHBORHOOD OF A SELENIUM-REFINING PLANT.) Shikoku Acta Medica 14:846-54 (May), 1959.

Particles discharged from a Se-refining plant were estimated to contain Se, Pb (no values) or S dioxide. Clinical signs observed among the population in the vicinity of the plant are considered to be suggestive of Se-poisoning. (From APCA Abstracts 6: Abstract No. 3333, 1960)

3298 Urakubo, G., and Yamate, N.: (AIR POLLUTION BY EXHAUST GAS. IV. DETERMINATION OF EXHAUST GAS IN KANMON VEHICULAR TUNNEL.) Bull. Natl. Hyg. Lab. (Tokyo) 77:23-6 (Sept.), 1959.

An air pollution study in the Kanmon underwater vehicular and pedestrian tunnel in Japan showed 3.96 μg Pb/m^3 air at 9 AM under the following circumstances: traffic flow, av 36 gasoline-powered vehicles and 24 diesels/hr; air flow, 0.245 m/sec with a volume displacement of 35 m^3/sec; temperature, 23.2°C; humidity, 100%. Further studies were made at 10 AM and 4 PM and it was concluded that the levels of air pollution in the tunnel would not constitute any hazard to health since ventilatory conditions were good. (From APCA Abstracts 7:Abstract No. 3852, 1961)

3299 U.S. Advisory Committee on Tetraethyl Lead to Surgeon General of Public Health Service (H.J. Magnuson, M.D., Chairman): PUBLIC HEALTH ASPECTS OF INCREASING TETRAETHYL LEAD CONTENT IN MOTOR FUEL. U.S. Public Health Service Publication No. 712, 1959, 49 pp.

The Committee which convened on Jan 8-9, 1959, concluded that "(1) a change in the maximum concentration of TEL in motor fuel from 3.0 to 4.0 cc/gal would not increase the hazards involved in the manufacture and distribution of Pb gasoline and (2) available data do not indicate that such change would significantly increase the hazard to public health from air pollution." Should the industry increase the concentration of TEL, it is recommended that: "(1) the industry proceed cautiously with the increase so that the increase in any one year in the TEL content of US pool gasoline not exceed 0.25 cc, and the concentration of TEL in US pool gasoline not be >3.2 cc/gal at the end of 5 yr; (2) the industry supply annually to the Public Health Service the domestic consumption figures for TEL; (3) the Public Health Service, in collaboration with the manufacturers of TEL, the petroleum industry, and other appropriate organizations, conduct studies to provide more definitive data on levels and trends of atmospheric Pb contamination in selected urban areas and of the body burden of Pb of selected population groups. If these studies should bring to light new data of significance, you may wish to reconsider the recommendation of this Committee." The report gives tables on consumption of TEL in USA for the years 1924-58 and estimated consumption based on 3- and 4-cc limits for 1959-63; particulate atmospheric Pb concentrations in selected cities. The technical aspects and advantages of increasing TEL concentration are presented; the Pb exhausted (weight %) in particulate size ranges, Pb retained by automobile exhaust systems and lubricating oil are tabulated. The hygienic aspects are reviewed by R.A. Kehoe: Evidence gained from surveys of the Pb content of urban atmospheres, general sources of human exposure to Pb, experimental studies of the metabolism of Pb under abnormal conditions demonstrate conclusively that the contribution made by the TEL contamination of the atmosphere to the total absorption of Pb by the American population has been remarkably small in either relative or absolute terms and that it has been minute physiologically and insignificant hygienically, despite the tremendous increase in the use of TEL. During the past 11 yr, during which the greatest expansion of TEL has occurred, there has been no sign that the average individual in the US has sustained any measurable increase in the concentration of Pb in his blood or in the daily output of Pb in his urine. In considering the hygienic effect of an increase in the content of Pb in gasoline there is assurance, based upon earlier experience and further investigations, that the effects of the proposed changes could be established in advance of any harmful consequences.

3300 U.S. Public Health Service: PROCEEDINGS. NATIONAL CONFERENCE ON AIR POLLUTION, Washington, D.C., November 18-20, 1958. U.S. Public Health Service Publication No. 654, 1959, 526 pp.

At this Conference, Pb is mentioned briefly by L.A. Chambers in his discussion of "Where Does Air Pollution Come From"; in that by J. Cholak, "Can Standard Methods be Established for Identifying and Measuring Air Pollutants"; in N. Nelson's "How Air Pollution Has Its Effects on Health," and in R.L. Chass's "Extent to Which Available Control Techniques Have Been Utilized by Communities (1); Los Angeles County." In the latter, effective control has been achieved in secondary smelting and associated operations, including Pb, conducted in the County. In the discussion by L.A. Chambers on "Transportation Sources of Air Pollution (1) Comparison With Other Sources in Los Angeles," the author estimates that the use of 1000 gal gasoline releases to the air among other constituents (CO being the largest with 3200 lb), 0.3 lb solids (Zn, Pb, other metallic oxides and carbon); and every 1000 operating automobiles emit daily 3.2 tons CO, 0.6 lb solids (Pb, C, etc), among the various constituents.

3301 White, H.J. (Research-Cottrell, Inc., Bound Brook, N.J.): CHARACTERISTICS OF PARTICULATE MATTER. Industrial Wastes 4: 158-66 (Sept.), 1959.

The title subject is discussed because of the growth in importance of particle suspensions in gases and in the atmosphere. In the discussion on formation and classification, the terms of dust, smoke, fumes, mists, or fogs appear to be the most convenient in classifying particles of various sizes. General properties (including a chart of dispersoid properties), stability, particle size and structure, particle size statistics, resistive forces on particles and settling velocities, natural electric charges and conductivity, optical properties, and relation to gas cleaning processes are the main headings under discussion. Pb fume is included in a table of natural charges on some representative dispersoids.

1960

3302 Bainbridge, C.A.: FUME CONTROL AND RECOVERY IN LEAD SMELTING FURNACES. Chem. and Process Eng. Atomic World (London) 41:344-7, 351 (Aug.), 1960.

Because of its toxic nature Pb fume has become the subject of control legislation in most countries of the world. The Alkali Inspectorate controls the problem of air pollution as it affects the community at large. The requirements to control air pollution specify maximum concentrations and weekly mass emissions in inverse ratio to the volume of gas discharged from a furnace or chimney minimum. Fully automatic filters with properly designed ancillary equipment are compact, labor-saving and highly efficient, but their application to Pb furnace problems requires careful appraisal because of certain factors peculiar to this process. Under the maximum operating conditions the total volume of gas entering the filter, including the atmospheric air for secondary cooling should be 5000 ft^3/min at 100°C. Estimated maximum dust concentration is $\sim$1 ton/24 hr of which a useful proportion would be Pb oxide, the remainder consisting of carbonaceous material from the fuel and battery plates and dust from the metallurgical additions. The recovery efficiency is up to expectations and the plant is now operating satisfactorily. (From APCA Abstracts 6:Abstract No. 3267, 1960)

3303 Blythe, D.J., ed., Technical Co-ordinating Committee T1-8: LEAD AND ARSENIC REPORT. Informative Report No. 1. Journal of the Air Pollution Control Association 10:296, 343 (Aug.), 1960.

In some areas the allowable emission discharge for Pb permitted by air pollution statutes is extremely low, such as 0.00006 grain/ft^3, while in other areas the tolerances are higher. Consequently, methods and techniques used for prevention of air pollution vary in the secondary Pb plants throughout the country. Plants engaged in secondary Pb smelting with either a blast furnace or reverberatory furnace require an extensive system of air pollution control. Secondary smelting entails treatment of scrap Pb storage batteries and Pb residues which generate a heavy metallic laden fume having an unpleasant odor. These fumes have to be filtered or cleaned. The filtering of the fume through cloth bags is the best accepted process with a collecting efficiency of $>$99% of the solids. Other methods are also described.

Where air pollution control is very strict, emissions are first cooled to 250°F and then sent into a baghouse which has woolen or synthetic fiber bags. The gas stream may be further treated in an electrostatic precipitator to meet the ordinance requirements. Measures of control of pollution are discussed further in respect to refining and alloying of secondary Pb, as is the recovery of Pb from the discharges.

3304 California, State Department of Public Health: TECHNICAL REPORT OF CALIFORNIA STANDARDS FOR AMBIENT AIR QUALITY AND MOTOR VEHICLE EXHAUST. Berkeley, 1960, 136 pp.

The report includes a chapter on Pb in which the hazards of Pb intoxication are discussed as well as routes, indices, MAC values, etc, of Pb exposure. On the basis of published data, it seemed reasonable to allocate to air pollution exposure, half of the allowable body burden, or $\sim$45 μg/day of absorption, in addition to that from food and water. Air analysis made by the California State Department of Public Health gave the following average Pb values for 1957 (µg/m^3): Berkeley, 1.04; Los Angeles, 4.30; San Diego, 1.34; Mt. Hamilton, 0.12; the highest values were observed during fall and early winter when low level inversions and light winds are most frequent. In conclusion, it is stated that a considerable amount of data is available on the toxicity of Pb, although not sufficient to set a standard. Since relatively high atmospheric concentrations, compared with other cities, exist in LA, it is suggested that average Pb levels of blood and possibly urine of persons living in places with air pollution and with known occupational and smoking history be determined; also that balance studies be made in LA, including Pb in air breathed, and the Pb content of autopsy materials be determined.

3305 Dordevic, S., and Stanković, M.: Aerozagadenje i komunalni saturnizam u selu Malo Rudare. (AIR POLLUTION AND COMMUNAL SATURNISM IN THE VILLAGE OF MALO RUNDARE.) Higijena (Belgrade) 12:35-44, 1960.

A group of 107 individuals, mostly women and children, living in the title village near a Pb-Zn foundry (Trepča) was studied. Analyses were made of SO_2, inert dust, ZnO and Pb dust in the atmosphere; of urinary coproporphyrin (CP) and Pb in the blood and urine of the subjects. The concentration of SO_2 in air was 1 mg and of total dust, 3.4 mg/m^3; at times it was >10 ppm.

The effects attributed to SO_2 are first discussed. Among the 107 inhabitants examined (of a total of 114), 86% suffered from pharyngitis, 70% from enlargement of the tonsils, 62% from conjunctivitis, 33% from rhinitis, 10% from bronchitis, 3% from bronchial asthma, and 2% from nephritis. In addition to this, the frequency of dermographism was seen in 25%, Pb gingival line in 1%, hypertension in 2%, and red cell counts of 4-4.5 million in 21.8% and of 2.5-3.5 million in 78.2%. The latter findings are discussed under the heading of "communal Pb poisoning." Overt signs of poisoning were not seen, except for frequent complaints of pains in body and dermographism, and the frequency of tremor was not high. In blood, stippled cells were not found; Pb content, determined in 71 inhabitants ranged from 37-70.8 µg%, mean 49.38; the corresponding values for Belgrade residents were 20-57.8 and 33.7; urinary Pb, 56-301.8 µg/l, mean, 136.8; in Belgrade, 15-70.8 and 40.4; CP in urine, 9.9-109.8 µg/l, mean, 43.48; in Belgrade, 3-66.6 and 28.88. Aside from atmospheric concentrations which ranged from 59-136 µg/m^3 (mean, 117), Pb content in water ranged from 33-63 µg/l, compared with 23 µg in Belgrade; in the surface soil, Pb ranged from 86.0-222.1 mg%, mean, 141.1, and at 30-cm depth, 18.4-26.8 and 22.6; in a Belgrade park, 0.35 mg%; in dust collected from a roof, 252 mg%. In analyses of animal products, cheese made from sheep and cow's milk showed 132 and 124 µg%, respectively, while Belgrade milk showed 10-15.5 µg%; onions contained in 2 samples, 0.580 and 0.784 mg% Pb.

The results of the study pointed out to the authors that care should be taken in establishing industries near inhabited places, since many harmful effects of factory effluents are not neutralized at a distance of 1000 m. They stress that what can be tolerated under occupational conditions, cannot be permitted under communal conditions.

3306 Dubrovskaya, F.I.: CITY STREET AIR POLLUTION BY AUTOTRANSPORT USING ETHYLATED GASOLINE. Gigiena i Sanitariya 25, No. 4: 15-8, 1960. In Levine, B.S.: U.S.S.R. Literature on Air Pollution and Related Occupational Diseases. Washington, U.S. Department of Commerce, Office of Technical Services, 1962, Vol 7, pp. 275-9.

Investigations carried out in 1957 and 1958 by the F.F. Erisman Moscow Scientific Research Institute of Sanitation and Hygiene in cooperation with the cities Tula, Chelyabinsk, Kuibyshev, Perm, and Gor'kii are described. Samples were collected at pedestrians' breathing level during periods of heavy traffic in an area where no industries were located, during the spring and summer of 1958, but only in the winter of 1957. The K chromate method was used and results were made on the basis of 24-hr averages. The average concentrations found in 1957 and 1958 were as follows in µg/m^3: Tula, 140 and 0.24; Chelyabinsk, 3.86 and (not determined); Kuibyshev, 0.36 and 0.68; Perm, 1.90 and below sensitivity of method: Gor'kii, - and 0.03. The lower concentrations in 1958 are explained by the fact that a lower amount of Pb was added to gasoline, and Pb-free gas was used in Perm. In addition, traffic directing personnel (>40 yr old) at points of heaviest traffic, 41 within the city, and 44 outside the city limits were subjected to rigid examinations. Some manifested deviations in the nervous system (vegetative dysfunction) and in the cardiovascular system (dystrophic and hyper- or hypotonic). Blood pictures showed reticulocytes and erytarocytes with basophilic stippling; the latter were also seen in the Chelyabinsk personnel. Deviations from normal functioning of individual organs were found less frequently among men stationed at city outskirts. Of 2 men examined while in the hospital, 1 had Pb poisoning despite the fact that he had never been in contact with Pb. The author recommends that the use of TEL-gasoline be discontinued.

3307 Emel'yanov, B.V., Shemyakina, Z.N., and Khalyavin, M.N.: (PURIFYING AIR CONTAINING TETRAETHYLLEAD VAPORS.) USSR patent 127,263, March 25, 1960.

The air to be purified is mixed with a gas containing ozone, eg, ozonized air or anode gas. (From Chemical Abstracts 54:18842, 1960)

3308 Fatzer, R. (Wädenswil, Switzerland): Zur Frage der Blei- und Bleibenzinvergiftung. (INTOXICATION BY LEAD AND LEADED GASOLINE.) Ars Medici (Switzerland) 6:404-5, 1960.

The greater hazard of intoxication by TEL as compared to intoxication by Pb is discussed. It is also pointed out that inhaled Pb compounds have a much more harmful effect than ingested Pb compounds. In mentioning Dr. Kehoe's publications, the author claims that the erroneous opinions of American scientists are based on the supposition that TEL, due to its high boiling point of 200°C, does not evaporate together with the gasoline. This supposition, according to Fatzer, has been proved to be wrong by Jecklin.

3309 Fatzer, R. (Wädenwil, Switzerland): Eine Entgegnung auf "Vergiftungen durch Bleibenzin in Kritischer Sicht." (A REPLY TO "CRITICAL APPROACH TO CASES OF POISONING BY LEADED GASOLINE.") Praxis 49:1151-3 (Dec. 8), 1960.

A review of the literature favoring the author's standpoint in his crusade against the use of leaded gasoline, and in answer to Stöckly's criticism of Fatzer's publications. (35 references)

3310 Goldsmith, J.R. (California State Dept. Pub. Health, Berkeley): DISCUSSION OF SYMPOSIUM ON LEAD AND CARBON MONOXIDE. In California State Department of Public Health: The Fourth Air Pollution Medical Research Conference, Dec. 7, 8, and 9, 1960. Berkeley, Calif., 1960, proceedings of the third day, pp. 62-88.

A number of people participated in the discussion which centered on the Pb and CO levels in tissues of humans in urban areas. Several participants mentioned that nothing has been reported clinically that would indicate a state of poisoning in populations by the minute amounts of metals in the air.

3311 Hill, C.R. (Royal Cancer Hosp., London, England): LEAD-210 AND POLONIUM-210 IN GRASS. Nature 187:211-2 (July 16), 1960.

The observed α-activity of grass may be increased by the natural fall-out of ^{210}Pb from the decay of atmospheric Ra, which is deposited on foliage by rainfall, combined with a fraction of the equilibrium amount of ^{210}Po. The presence of ^{210}Po in the kidneys of sheep of local origin, purchased in each of 2 Welsh towns close to areas of high rainfall, indicated a metabolic uptake of some of this activity.

3312 Khrustaleva, V.A. (F.F. Erisman Inst. Sanit. Hyg., Moscow, USSR): Opredelenie malykh kolichestv svintsa i tetraetilsvintsa v vozdukhe i drugikh sredakh pri gigienicheskikh issledovaniyakh (v svyazi s primeneniem etilirovannogo benzina). (DETERMINATION OF SMALL CONCENTRATIONS OF LEAD AND TETRAETHYL LEAD IN THE AIR AND IN OTHER MEDIA DURING HYGIENIC INVESTIGATIONS (IN CONNECTION WITH ETHYL GASOLINE).) Gigiena i Sanitariya 25:57-60 (Mar.), 1960.

Since in the usual methods of determining atmospheric Pb, large losses of Pb result from its extraction from filters or other collecting media, a method was developed to determine Pb directly in the filter. Air is aspirated through an ashless filter (FPP-15), converted to $PbSO_4$ with H_2SO_4, the filter is ashed at 500-550°, and Pb determined nephelometrically as $PbCrO_4$ after solution of the $PbSO_4$ in NH_4 acetate. A motor, brand "Pobeda" was operated at various rates of speed with TEL or Pb-free gasoline. In both cases, the values for O, H, CO_2 and CO in the exhaust gases were similar, but the TEL-exhausts contained a significant amount of inorganic Pb. No TEL was found in the exhaust gases or in the air of garages, car barns or buses. Exhausts from an automobile, brand GAZ-51 showed 64-81% Pb; at the speed of 15 and 30 km/hr, 1.4 g Pb/hr was emitted. Air in buses standing in garages or carparks contained up to 0.1 mg Pb/m^3. In Tula, 74 air samples from streets with heavy traffic showed 0.1-6.9 μg Pb/m^3. Recognizing the hazard of absorption of TEL through the skin, 10 samples of water in which automobile mechanics had washed their hands were analyzed as to total quantity of Pb, deducting the value representing TEL and then calculating the remaining Pb. The values tabulated of actual Pb and TEL found in μg (unit wherein determined is not given) were: 4-70 of Pb and 6.9-120 of TEL, and in one exceptional case the values were 290 and 2830, respectively.

3313 McKee, H.C., and McMahon, W.A., Jr. (S.W. Res. Inst., San Antonio, Tex.): AUTOMOBILE EXHAUST PARTICULATES - SOURCE AND VARIATION. Journal of the Air Pollution Control Association 10:456-62 (Dec.), 1960.

The study includes the determination of Pb emissions in particulate samples taken from a 1954 Plymouth engine. The Pb emissions were measured as Pb compounds, containing an average of 62.6% Pb, at various operating conditions in mg/min: idle, 4.8; 30 mi/hr cruise, 22; 50 mi/hr cruise, 97; 30 mi/hr acceleration, 2.6; 30 mi/hr deceleration, 13.

3314 Maga, J.A. (Calif. State Dept. Public Health, Berkeley): STATEWIDE AIR POLLUTION STANDARDS IN CALIFORNIA. American Industrial Hygiene Association Journal 21:430-5 (Oct.), 1960.

The following statement relating to Pb is presented concerning standards for ambient air quality: "It is clear that Pb levels should be set on the basis of average values for long periods. While data are abundant concerning human response to 8-hr-a-day, 5-days-a-week exposures, data are insufficient for the effects of the continuous exposure inherent in community air pollution. While laboratory studies will be pursued with vigor, it becomes very important that local agencies collect data on existing Pb levels. Since Pb exposures are from multiple sources, community air pollution standards should be based on a portion of the total limit for population exposure."

3315 Maga, J.A., and Goldsmith, J.R. (California State Dept. Pub. Health, Berkeley): STANDARDS FOR AIR QUALITY IN CALIFORNIA. Journal of the Air Pollution Control Association 10:453-5, 467 (Dec.), 1960.

See preceding abstract.

3316 Manhood, J., Roman, C., Bertin, V., Latorre, M., and Doberti, A.: Estudio de la intoxicación por plomo en los niños de la población San Enrique de las Condes. (LEAD POISONING IN CHILDREN OF THE SAN ENRIQUE DE LAS CONDES SETTLEMENT.) Revue Chilena de Pediatria (Santiago) 31:286-93 (June), 1960.

A fatal disease called "soroche" had been observed in animals in the area of an abandoned Pb factory.

When a dozen families with a total of 58 children settled in this spot a few years ago, 14 of the children soon developed chronic Pb poisoning, and 13 had fits which in 6 of them were caused by Pb encephalopathy. Analyses showed 0.15-0.25 mg Pb/l in drinking water, and the soil contained 5.8-9.5% of insoluble and 0.4-0.7% of water-soluble Pb. (From Toxic Episodes in Children 2:Abstr. No. 1, 1961)

3317 Schuck, E.A., Doyle, G.J., and Endow, N. (Stanford Res. Inst., Calif.): A PROGRESS REPORT ON THE PHOTOCHEMISTRY OF POLLUTED ATMOSPHERES. Air Pollution Foundation Report No. 31, 1960, 79 pp.; Appendices: A 1-7; B 1-8; C 1-18.

The study of the photochemical interaction of atmospheric pollutants includes investigations on the effects of various nuclei sources on the formation of aerosol particles in photooxidized olefin-NO_2-SO_2 mixtures. Besides the aerosol formation via the SO_2 mode, aerosol growth from other nuclei known to be present in air was investigated. Pb-bearing nuclei resulting from the volatilization of $PbCl_2$ into moist air had no effect in the absence of SO_2, but in the presence of 0.1 ppm SO_2, light scattering was suppressed, and the number of countable particles tended to be greater, especially at low humidities. It is concluded that Pb-containing nuclei are prominent suspects in the nucleation of aerosols in air contaminated by motor vehicle exhaust.

3318 Stokinger, H.E. (US Pub. Health Serv., Cincinnati, O.): CONTROL OF THE ENVIRONMENT: ATMOSPHERE AND WATER. Federation Proceedings 19:543-8 (July), 1960.

Pb in a variety of forms is recognized as a potentially toxicologic air pollutant. Basic data-collecting is being done by the Public Health Service in both engineering and medical fields. Included in this program are studies of body Pb levels on "high-exposure" groups to automobile exhausts of leaded gasolines. In the most recent Rule No. 63 of the State of California on air pollution standards for community air quality no thresholds have been established for Pb as adverse, serious or emergency levels due to insufficient data. Pb compounds are among the substances proposed for revised USPHS drinking water standards.

3319 Stokinger, H.E. (US Pub. Health Serv., Cincinnati, O.): WATER AND ATMOSPHERE. Federation Proceedings 19, Part II (Suppl. 4):26-30 (Sept.), 1960.

In this discussion, Pb is listed among the recognized air and water pollutants.

3320 Warren, H., and Delavault, R.E. (Univ. Brit. Columbia, Vancouver, Canada): OBSERVATIONS ON THE BIOGEOCHEMISTRY OF LEAD IN CANADA. Transactions of the Royal Society of Canada 54, Sect. IV:11-20 (June), 1960.

Data obtained from 60 analyses of Canadian soils suggest that all normal soils contain Pb, usually at a level of between 0.5-5 ppm. Soils over some rocks may contain as much as 25-300 ppm Pb. Pb contamination of the soil may result from mine waste, orchard sprays (Pb arsenate) and exhaust fumes of TEL. Results of analyses of vegetation at various localities in Southern British Columbia were divided into 3 groups according to their Pb content (ppm in ash): normal, ranging from av 8-39; moderately anomalous, av 48-250; and strongly anomalous, av 300-1600. The last group consisted of conifers growing within 100 yards from a highway in the Vancouver area. The method used for ashing of plants and Pb determination is described.

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3321 Anonymous: SAFE AIR AND MOTOR-CARS? Lancet 2:883-4 (Oct. 14), 1961.

Various aspects of air contamination by road vehicles are discussed including Pb emission in exhaust gases. Appeals to the public on the importance of vehicle maintenance, avoidance of overloading, and the hazards of smoke emission should be more urgent.

3322 Blánariu, D.: (THE NATURAL RADIOACTIVITY OF RAIN WATER.) Acad. Rep. Populare Romine, Filiala Iasi, Studii Cercetari Stiint., Fiz. Stiinte Tehn. 12:191-8, 1961.

The natural radioactivity of rain at Jassy in the summer of 1961 was investigated. The samples were always collected within 10 min and then a fixed quantity of the liquid was evaporated to dryness. The β activity of RaB (^{214}Pb) and RaC was measured with a thin-window G-M counter. The specific activity of the 29 samples measured varied between 0.88×10^{-11} and 10.11×10^{-11} Ci/ml with a mean value of 4.02×10^{-11} Ci/ml. The effective half-life of the activity was 25-36 min. It was found that the specific activity of rain is inversely proportional to their intensity (as expressed in ml/cm^2/min). During rainfall there was no systematic variation in specific activity; this indicates that the main raindrop activation mechanism occurs in the cloud system. (From Nuclear Science Abstracts 17:Abstr. No. 21903, 1963)

3323 Cappuccilli, P.: Moderne vedute sugli inquinamenti atmosferici. (MODERN VIEWS ON ATMOSPHERIC POLLUTION.) Ann. Med. Nav. (Rome) 66:613-32 (Sept.-Oct.), 1961.

The pollution of air in Italy from motor vehicles and industrial plants is discussed. The amount of Pb chloride and Pb bromide (among other substances) present in the exhaust gas as a result of the TEL content of gasoline, depends on the running speed and efficiency of the motor. A liter of gasoline ethylated at 0.5%, produced 0.35 g Pb. The possible harmful effects of air pollution on man are mentioned and several suggestions, such as reducing motor vehicle emissions, decentralizing industry, and separating industrial and residential areas, for control of air pollution are made. (From APCA Abstracts 8, Abstr. No. 4533, 1962)

3324 Cholak, J., Schafer, L.J., and Sterling, T.D. (Univ. Cincinnati, O.): THE LEAD CONTENT OF THE ATMOSPHERE. Journal of the

Air Pollution Control Association 11:281-8 (June), 1961.

Since 1946, many determinations of the levels of atmospheric Pb at various sites in a number of cities have been made and an extensive and intensive air monitoring program was carried out in Cincinnati from January 1957 - December 1959. Samples of airborne particulate Pb were generally collected by electrical precipitation or filtration, and, later, by a staplex high volume sample. The Hemeon or AISI smoke sampler was also used to determine the fluctuations of Pb in air during successive periods of 1 or 2 hr. Spectrochemical and dithizone methods were used for the determination of Pb.

For the comparison of Pb in the air of cities of varying population, only the samples collected during comparable years (1954-55) were considered. A total of 1229 samples from 24 cities, classified by populations, were analyzed. Of these samples, 700 were analyzed for the National Air Sampling Network, and another 280 in Los Angeles during the "smog" of 1954. The cities represented in this survey were: Anchorage, Alas., Frederick, Md., Ypsilanti, Mich., <100,000; Chattanooga, Tenn., Charleston, W.Va., Salt Lake City, Utah, Tampa, Fla., Elizabeth, N.J., 100,000-500,000; Atlanta, Ga., Denver, Colo., Kansas City, Mo., Louisville, Ky., New Orleans, La., Portland, Ore., 500,000-1,000,000; Cincinnati, O., Houston, Tex., Minneapolis, Minn., Washington, D.C., 1,000,000-2,000,000; Detroit, Mich., Los Angeles, Calif., New York City, N.Y., Chicago, Ill., Philadelphia, Pa., San Francisco-Oakland, Calif., >2,000,000. The findings are tabulated along with the mean and median concentrations. In cities of 1-2 million (M), the mean concentrations in the air ranged from 1.47-1.99 µg Pb/m^3 while the median ranged from 1.20 µg-1.42 µg Pb/m^3; those for cities >2 M show that levels of Pb concentration were higher with respect to the range of values as well as to mean and median values (2.85 without L.A., 4.28 with L.A., and 2.38 and 3.52, respectively; in L.A. only 5.41 and 4.91). The diurnal patterns and yearly trends, obtained from around-the-clock monitoring at stations in Washington, San Bernardino, L.A., and Cincinnati, which were considered representative at individual stations, are shown in 2 graphs, and the frequency of occurrence of certain concentrations in Cincinnati at all stations for the years 1946-1959 are tabulated. From the overall results, the authors conclude that contrary to predictions, a downward trend in Pb values in air is noticeable. The steady increase in the number of automobiles and housing could be expected to produce higher Pb values in air, but improvements in the quality of fuels and enforcement of air pollution controls as well as changes in traffic patterns due to movement of the population to the outskirts, slum clearance, infiltration of expressways, etc, are among the factors causing lower Pb values in the city air. Analysis of the sources of Pb in air shows that combustion of leaded motor fuel does not account for all or even the major proportion of Pb in air. Other sources include Pb-containing industrial dusts, the weathering of Pb-containing products (paint, solder, bearings), combustion of coal, top soil at the sites of old built-up areas, etc. The general findings are not in agreement with the predictions that the increased consumption of leaded motor fuel will cause a proportionate increase in the overall average Pb concentration in the air over expanding metropolitan centers.

3325 D'Ambrosio, A. (Chemical Lab. Hyg. and Prevention, Province of Milan, Italy): Über das Problem der Grundverunreinigungen der Atmosphäre. (PROBLEMS CONCERNING THE BASIC CONTAMINATION OF THE ATMOSPHERE.) Microchimica Acta 1961, No. 6:927-67.

The principal problems regarding the basic contamination of the atmosphere are reviewed. The presence of Pb in the atmosphere as the result of motor exhausts, and the use of TEL are included in the discussion. Also mentioned are the effects of Pb on the enzymatic system. A demand is made for a more effective legislative enforcement of the precautions essential to preserve the purity of the atmosphere.

3326 Farnbach, R.J. (Dept. Health, Victoria, Australia): HEALTH EFFECTS OF AIR POLLUTION. Proc. Clean Air Conf., Univ. New South Wales, 1961, 1:6.1-10.

The effects of S dioxide, CO, Pb and carcinogens in the atmosphere on human health are assessed. Industrial air pollution and effects caused by acute episodes are discussed. (From Chemical Abstracts 39:1027, 1963)

3327 Fatzer, R.: Zur heutigen Situation in der Bleivergiftungsfrage. (THE CURRENT SITUATION OF THE PROBLEM OF LEAD INTOXICATION.) Vitalstoffe Zivilisationskrankh. 1961, No. 26.

The author emphasizes the danger of exposure to Pb by inhalation and lists the following reasons: The beneficial detoxicating action of the liver is lost in respiratory absorption of Pb; Pb dust is especially fine and penetrating; the absorption of Pb by the intestine represents only 1/10 of the quantity absorbed orally whereas by inhalation 1/2 of the Pb absorbed is passed through the circulatory system. Motor vehicle exhausts, responsible for the pollution of the street air, release vapors of TEL in quantities sufficient to cause frequent, unrecognized chronic Pb intoxication. Therefore, the suppression of the use of Pb as an additive in gasoline, and the adoption of protective measures on an international scale, are suggested.

3328 Goldsmith, J.R. (Calif. State Dept. of Public Health, Berkeley): HEALTH EFFECTS OF MOTOR VEHICLE EXHAUST. A report presented to the Motor Vehicle Pollution Control Board, Los Angeles, August 11, 1961, 27 pp.

The public health problem of atmospheric pollution from additives in motor fuels, including that caused by the use of Pb additives, is discussed. Recent studies conducted by the Department of Health of the State of California on atmospheric Pb concentrations, Pb particle size, and their possible relationship to Pb absorption and levels in blood and urine, are reviewed. Also included are tables of atmospheric concentrations of Pb in various cities in California. (19 references)

3329 Hofreuter, D. (US Pub. Health Serv., Cincinnati, O.): THE AUTOMOTIVE EXHAUST PROBLEM. ITS RELATION TO HEALTH. Archives of Environmental Health 2:559-63 (May), 1961.

The author's discussion centers on the problem of how automotive exhaust products may affect the public health, considering the following: The chemical composition of automobile exhaust; some past investigations; the possible irritating qualities of these exhausts; the possible relationship to lung cancer; the possible effects of specific substances (CO and Pb), and a few of the current medical projects that are under investigation by the Division of Air Pollution. Among the latter are extensive studies concerning the range of blood Pb levels among a cross-section of urban and rural populations. Blood samples were drawn from ~125 people in each of 8 cities (New Orleans, Dallas, Denver, Chicago, Cincinnati, New York, Los Angeles, and San Francisco) and in 1 rural area in central Ohio, with subjects selected from volunteers at blood banks in the various areas. Another survey was of the blood and urine Pb levels of ~35 employees of an automobile inspection center in a large Midwestern city. This was to provide conditions similar to the typical stop-and-go traffic of a city street corner. Also included were 65 garage mechanics. Aerometric measurements of the working environment were made concurrently. The above studies are under evaluation. Additional studies are planned to include people with certain chronic diseases and the very young to determine if they represent populations more susceptible to the effects of Pb. A study is also being conducted, aside from those concerning CO, to determine the short-term effects of irradiated automobile exhaust on experimental animals.

3330 Honda, R., and Honda, M. (Univ. California, San Diego): NATURAL RADIOACTIVITY IN THE ATMOSPHERE. Journal of Geophysical Research 66:3227-31, 1961.

The activities of cosmic-ray-produced radioisotopes, among them ^{210}Pb, arising from the decay of radon, were measured in samples of dust filtered from stratospheric and tropospheric air. The isotopes are produced at widely different rates in different regions of the atmosphere depending on altitude and latitude and these characteristics of the production make it possible to use the isotopes to measure the time scales of air transport from one region of the atmosphere to the other. The uncertainty in the measurements (the error may be as large as 20-30%) stems from the fact that the exact volumes of air sampled are not accurately known. The purity of the sources was ascertained from the characteristic γ spectra of the isotopes; that of ^{210}Pb from the growth of ^{210}Bi in them. The results of the various measurements are given in a table. The activities of ^{210}Pb were found to be 0.1-0.2 dpm/10^4 l, and markedly uniform. The inventory of ^{210}Pb in the stratosphere was of the order of 0.001 dpm/cm^2, which is a very small fraction (<0.01%) of the average inventory of radon in the atmosphere. The concentrations in the stratosphere are in general higher than or comparable to those in the troposphere. The loss of ^{210}Pb from the stratosphere occurs by the process of decay and of transfer to the troposphere.

The concentrations as measured by Burton and Stewart (1960) over England are 5 times higher than in the greater part of the stratospheric regions over the US, which may be due to some local causes.

3331 Jones, A.[illegible], Brief, R.S., Bennison, E.E., and Hausheer, W.[illegible] (Esso Res. Eng. Co., Linden, N.J.): EVALUATING THE HAZARDS OF AUTOMOBILE GASOLINE ADDITIVES. RECOMMENDED PROCEDURES. Archives of Environmental Health 2:635-40 (June), 1961.

The various aspects in assessing the public health implications of a toxic gasoline additive were examined. The regimen covered 3 phases. The experimental phase included a literature review, a toxicity, environmental, and a clinical program. In the toxicity tests, the pure additive (an organic Hg compound) showed the same order of toxicity as TEL, but at the anticipated concentration in gasoline, it did not significantly increase the toxic effect of the gasoline. In the field trial phase, the atmospheric sampling program called for a baseline study prior to the introduction of the new fuel, and a test period study after a steady-state marketing level was reached. Among the samples and measurements considered desirable were air samples for the determination of Hg, particulate Pb and CO, with the last 2 to give an indication of the concentration of auto exhaust in the air. This phase also included discussions with health officials. In regard to the commercial phase which was not started because of technical reasons, a general program for evaluating potential health problems was presented.

3332 McKee, J.E., Faith, W.L., Heukelekian, H., Mancuso, T.F., Mark, E.M., and Sawyer, C.N.: 100 PROBLEMS IN ENVIRONMENTAL HEALTH; A COLLECTION OF PROMISING RESEARCH PROBLEMS. Washington, D.C., Jones Composition Co. and Kirby Lithograph Co., 1961, pp. 17-8.

The public health problem of motor-fuel additives such as TEL and TML is discussed. From what is known of the toxicity of TEL, it is clear that the likelihood of acute toxicity in public exposure is very slight. The problem is therefore one of chronic toxicity. Studies of Pb values in blood and urine, at occupational and non-occupational exposures should be conducted to resolve this problem without delay.

3333 Maga, J.A. (California State Dept. Pub. Health, Berkeley): A STATE APPROACH TO AIR POLLUTION. American Journal of Public Health 51:1662-9 (Nov.), 1961.

The approach to the air pollution problem taken by California is discussed. It is similar to that of other states in many respects but differs in requirements with certain problems, especially with vehicular emissions. The latter has resulted in the requirement of air pollution control devices on motor vehicles. An orderly procedure for dealing with the problem has been developed. The tables presenting the standards for ambient air quality, established in 1959, show for Pb under the column "Adverse" Level, not applicable; for the "Serious" Level and "Emergency" Level, footnote states: "It is clear that Pb levels should be set on the basis of average values for long periods. While data are abundant concerning human response to 8-hr-a-day, 5-days-a-wk exposures, data are insufficient for the effects of the continuous exposure inherent in community air pollution. While laboratory studies will be persued with vigor, it becomes very important that local agencies collect data on existing Pb levels. Since Pb exposures are from multiple sources, community air pollution standards should be based on a portion of the total limit for population exposure."

3334 Monaci, V. (Univ. Parma, Italy): Sull'inquinamento dell'aria causato dai veicoli a motore. (AIR POLLUTION FROM AUTOMOBILES.) Ateneo Parmense Suppl. 1. 32:36-40, 1961.

The author starts his discussion of the title subject by stating that the latest news on air pollution by motor vehicles stems from Los Angeles with the 1957 publication by Faith on photochemical smog. In Italy, investigations have centered primarily around the CO content of urban air, as published from 1956-60. In a tabulation of 6 published surveys, Pb findings contributed by Giubileo (1957) for Milan were 2.4-7.4 $\mu g/m^3$ in air and 0.44-2.24 mg/g in dust.

3335 Schroeder, H.A., and Balassa, J.J. (Brattleboro, Vt., and Hartford, Conn.): ABNORMAL TRACE METALS IN MAN: LEAD. Journal of Chronic Diseases 14:408-25 (Oct.), 1961.

The concentrations of Pb in a variety of foods, tissues, vegetation and manufactured products were measured by a microanalytical chemical method and data on human tissues obtained by spectrographic methods were analyzed statistically. Pb values (μg/g of wet weight) in a variety of foods were: condiments, 0.0-1.5; sea food, 0.06-0.87 (mean 0.49); meats, 0.0-0.57 (mean 0.21); grains and grain products, 0.0-7.49 (mean 0.37); vegetables 0.0-1.26 (mean 0.21); fluids, 0.0-1.37 and 5-100 μg/l; cigarettes, 24.11; spices, 0.10-6.64. No obvious increase in Pb exposure from foods or fluids during the last 20 yr was demonstrated, although airborne Pb had probably increased. However, this increment to the total body is usually small. Analysis of potable water (μg Pb/l) showed: tap water, 2.5; spring, 0.0-112.5; melted snow at the edge of town, 0.0-77; melted snow on top of mountain where auto exhausts gases were expelled for 5 min, 1858. Tissues of various animals contained (μg Pb/g wet weight) 0.0-2.8 in liver; 0.0-26.17 in kidney; 0.16 in bone; 0.15-0.20 in muscle; 0.2-1.71 in heart; 2.13-2.51 in aorta. The Pb level (μg/g) in vegetation was found to range from 0.0-22.0 and in some common materials from 0.0-196.00. The mean Pb values in adult human kidney and liver (261 samples) from various areas of the world were (ppm ash), respectively, 23-160; 20-213. Levels in Africans were generally higher than in other races. The accumulation of Pb with age in tissues of American human beings in kidney, liver, lung, bone, pancreas, and aorta demonstrated a consistent pattern, reaching a maximum in the 5th or 6th decade. In 4 tissues the highest mean concentrations were 4-10 times these at birth or in childhood. Results indicate that daily amounts usually ingested by American adults are much lower than the limits set by Monier-Williams (0.40 mg) and Kehoe (0.35 mg). The authors conclude that Pb seems to be ubiquitous, that wild animals and birds are exposed to it, and that probably it is not an essential element; that Pb in human tissues appears to come from natural sources and from industrial contaminants, although the proportions from each source could not be estimated. (34 references)

3336 Schulz, A.P. (Düsseldorf, Germany): Reinhaltung der Luft. Rückblick auf eine VDI-Tagung. (THE PROBLEM OF CLEAN AIR, REVIEW OF A VDI-MEETING.) Chemiker-Zeitung 85, No. 5:141-3, 1961.

It was pointed out at the meeting that air pollution by exhaust from automobiles is one of the most serious problem. A comparison was made between diesel engines and spark ignition engines; both though different in quantity are identical in quality of polluting agents. The preventive measures for both types of engines were mentioned. The seriousness of the problem was illustrated by an example where Pb-containing dust had caused increased Pb content in the milk of cows grazing on pastures along a highway. Frequently the calves of these cows could not be reared. This illustration was used to point out that there is danger of pollution even where it is least expected. The VDI Commission for Clean Air set up a list of essential sources of air pollution, which includes traffic, analogous to the list set up by law for industries requiring a permit.

3337 Switzerland, Federal Leaded Gasoline Commission: Bericht der Eidg. Bleibenzinkommission an den Bundesrat über ihre Tätigkeit im Zeitraum 1947-1960. (REPORT OF THE SWISS COMMISSION ON LEADED GASOLINE TO THE FEDERAL COUNCIL ON ITS ACTIVITIES DURING THE PERIOD 1947-60.) Mitteilungen aus dem Gebiete der Lebensmitteluntersuchung und Hygiene 52, No. 3:135-244, 1961.

The preliminary investigation of the Swiss Commission on leaded gasoline, appointed on Apr. 11, 1947, to study the effect of TEL gasoline on public health showed that the quantity of Pb in the exhaust gases from cars varies much and amounts to ~20-50% of the Pb present originally in the gasoline. It consists mainly of inorganic Pb salts with traces of volatile organic Pb derivatives. It may reach much higher levels at higher motor speeds since the Pb deposited in the exhaust pipe is then swept off by the gases. The Pb particles have a diameter which averages <125 mμ and so behave practically like a gas. These particles are dispersed by the air currents and finally washed out by rain. The few larger particles quickly fall to the ground. It was shown that these are only slightly soluble; therefore, the hazard of water contamination is small. The quantity of Pb absorbed by the lungs av 60% of the Pb present in the air. The average city person, with no special exposure to Pb gasoline, takes up daily 20-30 μg of Pb from the air by breathing. In considering reports of sickness cases allegedly caused by Pb, the Commission found that of the 65 cases reported, in decreasing numbers over 8 yr, only 35 were proved to be related to gasoline. Of these 35 cases, 30 were caused by gasoline itself and only 5 by TEL. In persons working with Pb-containing gasoline, during 1955-56, the Pb blood content was 22 μg% (range of 10-40 μg%) against an average of 12 μg% (6-20 μg%) in those who were not so occupied in 1955-56-57. Persons working in the manufacture of Pb storage batteries had a much higher Pb content, 61 μg% (5-155 μg%). A maximum Pb content of blood of 40 μg may still be considered normal.

In the streets of Zürich, with intense traffic, the Pb content of the air was 1.4 μg/m^3 in 1949-50 with an increase to 4.5 μg/m^3 in 1960-61. These levels cannot be considered dangerous in view of the levels of 100-150 μg/m^3 established as limits for workers exposed to Pb. In the dust of the streets the amount was higher, from 0.052-0.25% (1948-60). Before Pb gasoline was introduced, soil adjoining road contained 0.006% and dust of rural roads, 0.0008% Pb. The quantity of Pb ingested with food was about 0.2-0.3 mg/person/day in Switzerland and, under worst conditions, the air from the streets contributed 0.03 mg/person/day.

It is concluded that TEL in gasoline has not and is not currently endangering health, but that it might become a problem since the Pb content in the air is increasing as traffic increases and since no substitute has yet been found for Pb in the manufacture of gasoline.

The report closes with recommendations which include supervision of commerce in Pb gasoline, continuation of periodic investigations, possibilities of using Pb-free fuels, and removal of Pb from exhausts, ventilation of garages, regulation of traffic. Appendices cover the Department of Interior regulations for the distribution and use of Pb gasoline; special regulations for garage and filling station proprietors and their employees; notices pertaining to the handling of Pb gasoline; special regulations for consumers with own tank installations (agricultural, etc); for import and wholesale commerce; technical and physiologic investigations (by H. Preis); form for medical serial examinations (by D. Högger); electrochemical determination of Pb in blood (by H. Rosenmund); determination of Pb in blood, dithizone method) (by E. Lauber). The report was prepared by O. Högl.

3338 U.S. Public Health Service: RADIOLOGICAL HEALTH DATA MONTHLY REPORT, MARCH 1961. Volume II, No. 3, US Public Health Service Publication PB-161371-12, 57 pp.

Data are tabulated on the radioactivity in samples of air, surface waters, milk, and foods collected from various parts of the US. The bulk of the sampling was done during October 1960, but some data from previous months are included. Results are included on environmental levels of radioactivity in the vicinity of 5 major Atomic Energy Commission installations during the 2nd and 3rd quarters of 1960. Factors contributing to the occurrence of radionuclide levels in market milk are discussed. Results are included from a survey in Michigan of medical radiation exposure during pregnancy and measurements of the natural ^{210}Pb content of man. (From Nuclear Science Abstracts 15:Abstract No. 14588, 1961)

3339 Voukydis, I. (Athens, Greece): DANGEROUS VAPOURS FROM GASOLINE ENGINES. Praktika tes Akademias Athenon 36:364-8, 1961.

Ethyl fluid added as antiknock to automobile gasoline contains 61.42% TEL and 35.68% ethyl bromide. In the process of combustion, Pb bromide is formed which is by far more poisonous than TEL. The author concludes that the recent increase in heart disease and cancer may very probably be due to the inhalation of exhaust gases of automobiles.

3340 Warren, H.V. (Univ. British Columbia, Vancouver, Canada): SOME ASPECTS OF THE RELATIONSHIP BETWEEN HEALTH AND GEOLOGY. Canadian Journal of Public Health 52:157-64 (Apr.), 1961.

The geochemical aspects of Pb, Cu, Zn, Mo, Ag, Hg, and Cd in relation to health and the variations found in the soil are discussed. As to Pb, analysis of 112 carbonate rocks from various localities in Southern Ontario showed that 75% of the samples contained 1-5 ppm Pb and 5-10% >25 ppm. Vegetation which concentrates Pb, orchard sprays and automobile exhausts of TEL are considered as sources of Pb contamination of the soil. The author states that soils derived from rock may contain a much greater amount of Pb than the original rock, and that vegetation can on occasion concentrate Pb by as much as 10 times the Pb content of soil (ie, vegetables contained up to 700 ppm Pb). Samples taken near a highway contained unduly high amounts of Pb. Trees growing on a university campus contained several 100 ppm Pb instead of the normal level of 10-50 ppm. A possible relation between the amount of Pb in the soil and the incidence of multiple sclerosis is suggested. In areas where the incidence of multiple sclerosis was high, a different set of geological conditions was found and a greater amount of Pb was present in the earth's crust. The author urges combined effort by medical men, agriculturalists and geochemists, to study the anomalous food supplies.

1962

3341 Baranov, V.I., and Vilenskii, V.D.: (LEAD-210 (FALL-OUT IN ATMOSPHERIC PRECIPITATION).) Radiokhimiya 4, No. 4:493-6, 1962.

Measurements on fallout indicated ^{210}Pb may be an important component of natural background radioactivity. Data on precipitation were used for estimating the possible elimination of ^{210}Pb from the air. (From Nuclear Science Abstracts 17: Abstr. No. 14512, 1963)

3342 Brief, R.S. (Med. Res. Div. Esso Res. & Eng. Co., Linden, N.J.): AIR LEAD CONCENTRATIONS FROM AUTOMOTIVE ENGINES. COMPARISON OF CONCENTRATION WITH USE OF

GASOLINES CONTAINING TETRAMETHYLLEAD AND TETRAETHYLLEAD. Archives of Environmental Health 5:527-31 (Dec.), 1962.

The difference between the quantity of Pb found in atmosphere in and around automobiles burning fuel, containing either TML or TEL, was studied with 4 pairs of foreign cars of which each pair of the same make was run under identical conditions and the same period of time. Samples of air were taken for periods varying between 10-125 min. Atmospheric total Pb concentrations ($\mu g/m^3$), resulting from TML- and TEL-containing gasolines were, respectively: 1950-8620, 1430-8160 in exhaust gas; 15-121, 18-138 in air under the hood; 8-107, 7-14 in air at driver's seat; 16-44, 12-113 in ambient air, 4 ft behind the car. Differential values for the quantities of organic, inorganic, and total Pb in the atmosphere resulting from the use of TEL- and TML-containing fuels were tabulated. No significant increase in concentration of Pb in air was noted when gasoline containing TML was used, as compared with atmospheric Pb concentration resulting from gasoline containing TEL.

3342 Cannon, H.L., and Bowles, J.M. (US Geol. Surv., Denver, Colo.): CONTAMINATION OF VEGETATION BY TETRAETHYL LEAD. Science 137:765-6 (Sept. 7), 1962.

See Abstract No. 212.

3343 Drummen, M., and Reinl, W. (St. Vinzenz Children's Clinic, Stolberg, Germany): Über kindliche Bleivergiftungen und ihre Behandlung mit Ca EDTA. (ON LEAD POISONING IN CHILDREN AND THEIR TREATMENT WITH Ca-EDTA.) Medizinische Klinik (Munich) 57:604-8 (Apr. 13), 1962.

Pb intoxication in 2 sisters, 18 mo and 6 yr old, respectively, and a brother aged 7 yr is described. The children lived in a house close to a Pb foundry and played in a courtyard which probably was strongly contaminated with Pb oxide dust. The youngest child showed a typical Pb encephalopathy and kidney damage; the 2 other children had less distinct symptoms and no affliction of the brain or kidneys. X rays revealed interference of the bone growth in the distal epiphysis of the lower arm and lower leg. The children responded favorably to CaEDTA treatment in the form of Mosatil tablets.

3344 Editorial (F. Princi): CHEMICAL PROGRESS AND THE PUBLIC INTEREST. Archives of Environmental Health 5:525-6 (Dec.), 1962.

Attention is called to 2 papers (the 1st of 6) that describe the comparative hazards of 2 organic Pb gasoline additives. The series is of interest and of fundamental medical importance because the investigations were based on the knowledge that a measure of the toxicity and hazard of a relatively new substance is a comparison of the biological activity of the material with that of a related compound of known characteristics with which there has been extensive experience. The article by Brief is a careful appraisal of the concentrations of Pb in the air, produced in cars using gasolines containing TEL and TML. That by deTreville et al provides a comparison of the actual hazard of exposure to the compounds as well as experience in routine monitoring of an industrial production procedure, demonstrating the collaboration of medical and industrial hygiene surveillance. Finally, attention is called to the fact that these investigations were carried out at the direction of and with the support of the manufacturer or distributor, demonstrating the awareness of industry of its responsibilities to the public health and safety.

3345 Fatzer, R. (Wädenswil, Switzerland): Bleibenzin als dringliches hygienisches Problem. (LEADED GASOLINE AS AN URGENT HYGIENIC PROBLEM.) Ars Medici 2:119-24, 1962.

The literature on the biological effects of TEL is briefly reviewed. The previously used MAC of 0.15 mg Pb/m^3 is considered to be invalid; instead, a maximal allowable emission concentration, MEC, of 0.003-0.004 mg Pb/m^3, applicable for the 24-hr day, should be established. Abolishing TEL as an additive to gasoline is advocated because of its possible harm to public health and because it appears to be technically feasible. Simultaneously, 3 other toxic additives, ie, ethyl chloride, ethyl bromide and tricresyl phosphate should be eliminated.

3346 Fry, L.M., and Menon, K.K. (Univ. Arkansas, Fayetteville, Ark.): DETERMINATION OF THE TROPOSPHERIC RESIDENCE TIME OF LEAD-210. Science 137:994-5 (Sept. 21), 1962.

${}^{210}Pb$ activities and ${}^{210}Bi/{}^{210}Pb$ ratios with corresponding mean tropospheric residence times were determined in 12 samples of rainfall collected at Fayetteville, Arkansas. ${}^{210}Pb$ values ranged from 1.1-7.9 μμCi/l. The mean tropospheric residence time of ${}^{210}Pb$ was 5.9 and 6.6 days and in agreement with the mean interval of 6 days between 2 successive rainfalls in this area. This illustrates that ${}^{210}Pb$, formed by the disintegration of Rn in the atmosphere, is efficiently captured by raindrops and removed from the atmosphere.

3347 Garber, K. (Govt. Inst.-Applied Botany, Hamburg, Germany): Neuere Literatur über Rauch-, Staub- und Abgasschäden. II. (RECENT LITERATURE ON INJURY CAUSED BY SMOKE, DUSTS AND GASES.) Angewandte Botanik 36:127-84, 1962.

Included in this review are 8 papers on injury caused by Pb dusts emitted from Pb works. (607 references)

3348 Gusev, M.I.: NEW STUDIES ON THE EFFECT OF LOW LEAD CONCENTRATIONS ON THE HUMAN ORGANISM. In Ryazanov, V.A., ed.: Limits of Allowable Concentrations of Atmospheric Pollutants, Book 5, translated by B.S. Levine. Washington, US Department of Commerce, Office of Technical Services, 1962, pp. 19-28.

Porphyrin metabolism and urinary Pb excretion were studied in 3 groups of children 4-7 yr old, 196 living in the neighborhood of a cable-manufacturing plant, 111 from the vicinity of a Pb smelter and 100 from a control area. Air samples were taken from the 3 regions and the results of 24 hr Pb concentrations ($\mu g/m3$) were: Control, 0-0.27 (av 0.27); cable plant, 0.56-1.93 (av 1.02); Pb smelter 1.39-3.61 (av 2.53). The average CP concentrations in the 8-hr urine of the children were: 6.5 ± 0.2 for the controls; 8.2 ± 0.3 for those in the cable plant region; 10.5 ± 0.4 in the smelter region. The data showed that continued residence in an area of which the ambient air contains an av 24 hr concentration of Pb from 1.02-2.53 µg/m^3 causes an increase in urinary CP elimination. The Pb concentration in 8-hr urine of 56 controls and 54 children (both groups 5-7 yr old) in close proximity to the Pb smelter were determined (200 ml was taken for analysis). No Pb was detected in the urine of 12 children of the test group and in 25 controls. The concentrations for the controls ranged from 0.01-0.03 mg/l (av 0.015), and in the 42 near the smelter, 0.01-0.05 mg/l (av 0.023). Only 1 of the controls had a urinary Pb level >0.02 mg/l but 16 of the test group exceeded 0.02 mg/l. The author concludes that the results confirm the validity of the official MAC of Pb in atmospheric air. (21 references)

3349 Högger, D. (Swiss Commission on Air Hygiene, Zürich): Die Verunreinigung der Atmosphäre und ihre hygienische Bedeutung. (THE CONTAMINATION OF THE ATMOSPHERE AND ITS HYGIENIC ASPECTS.) Mitteilungen aus dem Gebiete der Lebensmitteluntersuchung und Hygiene 53:431-42, 1962.

The history, sources, and effects on health of air pollution are discussed, with chief emphasis on S oxides in connection with several disasters. In connection with pollution by motor exhausts, the work of the Swiss Commission on the use of Pb-gasoline is mentioned with the statement that so far Pb has posed no danger to the population. Conditions in cities and industrial areas of Switzerland are discussed.

3350 Husson, G., and Septier, L.: (AIR POLLUTION PROBLEMS IN MARTIN AND ELECTRIC STEEL MILLS IN RELATION TO THE USE OF OXYGEN.) Centre Doc. Siderurg., Circ. Inform. Tech. 1962, No. 9:1959-66.

Martin furnace dust amounts to 2-5 kg/ton of steel, 95% of the particles being 0.8-6 µ in diameter (av 2). Martin dust is 25-30% Fe oxides, 40-50% CaO, with smaller amounts of alkali metal oxides, along with those of Zn, Pb, Mn, Si, P, Mg and Al. In order to eliminate all visible fumes, 90-99% of the particles must be retained, leaving <100 µg dust/m^3. The proper design of vents, hoods, flues, etc, can simplify dust collection, by cooling and slowing down the escaping gas streams. (From Chemical Abstracts 58:9546, 1963)

3351 Larsen, R.I., and Konopinski, V.J. (R.A. Taft Sanitary Eng. Center, Public Health Service): SUMNER TUNNEL AIR QUALITY. Archives of Environmental Health 5:597-608 (Dec.), 1962.

Two aerometric studies, each lasting 1 wk, of the 1.1-mi-long Boston Sumner Tunnel were conducted in July and September, 1961. Approximately 35,000 vehicles ply this tunnel each day. The results showed the following average concentrations: CO in the tunnel, 70 ppm with instantaneous peaks as high as 257 ppm; soiling index values in Cohs/1000 ft air, <1 for inlet air, 2 for the Boston toll station and 4 for tunnel outlet air; mean total suspended particulates in inlet air, ~100 µg/m^3 (Pb 1 µg), in outlet air, ~600 (Pb 45); and in outlet air, the following: total organics, 225 µg/m^3 or ~40% of the total; benzo-(a)-pyrene, 0.69 (or ~10 times the highest measured in an American city in winter); benzo-(g, h, i)-perylene, 1 µg/m^3; coronene, 0.53 µg/m^3. The amounts of pollutants measured per vehicle-mile of tunnel travel were: CO, 60 g; total suspended, 0.36; organic suspended, 0.16; particulate Pb, 0.031. In estimating the relationship between Pb in gasoline and in air, at an average speed in the tunnel of 30 mi/hr, assuming an approximate fuel consumption of 1 gal of gasoline/13 mi traveled and using the gasoline as marketed in Boston in September, 1961, 0.15 g Pb were burned per vehicle-mile. In estimating the relative significance of vehicular exhaust on outdoor concentrations of suspended particulates, the order of the first several pollutants from most to least significant was: coronene, benzo-(a)-pyrene, benzo-(g, h, i)-perylene, Pb, total organics, Fe, Ti, and total suspended particulate.

3352 Lawther, P.J., Martin, A.E., and Wilkins, E.T. (Air Poll. Res. Unit; Min. Health, London; Warren Spring Lab., Stevenage, Herts, England): EPIDEMIOLOGY OF AIR POLLUTION. Report on a Symposium. World Health Organization Public Health Papers No. 15, 1962, 31 pp.

In this report, Pb is mentioned in the introduction as a pollutant arising from motor exhaust, but is not further elaborated.

3353 Lindsey, A.J. (Sir John Cass College, London, England): SOME OBSERVATIONS ON THE RELATIVE QUANTITIES OF AIR POLLUTANTS IN VARIOUS LOCATIONS. National Cancer Institute Monograph 9:235-50, 1962.

Extensive study has been made of some constituents of the atmosphere, while other pollutants and groups of pollutants have been relatively neglected. Attention has been focused on organic pollutants, but in England the major constituents of total air solids are inorganic in nature. Amounts and proportions vary according to season, climate, and time of day, while the industrial picture changes constantly due to the imposition of legal restraints and the use of new materials. The objects of the paper were to review the proportions of pollutants in air in relation to as many variables as possible and to assess the relative importance of the known constituents in carcinogenesis under various conditions. The quantitative analytical results presented were averaged for 1 yr in 1 place. The state of knowledge as of 1961 regarding the total air solids composition of the atmosphere is summarized, with special attention to polycyclic aromatic hydrocarbons, As, Fe, Ge, Pb, and V, which were plotted in air solids against time. There was no annual cyclic regularity in these pollutants, and, from such irregular results, the conclusions have no more significance than that the ash-producing fuels were somewhat variable in nature and therefore probably variable in origin. In a figure giving present quantitative knowledge on total air solids, Pb is listed at 0.09%. A list is given of 22 elements (including Pb) detected in ash captured from an urban atmosphere. (63 references)

3354 MacPhee, R.D., Eye, M.G., and Parkinson, E.E. (Los Angeles Co. Air Poll. Control Distr., Calif.; Univ. Cincinnati, O.): A METHOD FOR MONITORING ORGANIC LEAD IN THE ATMOSPHERE. Los Angeles, Air Pollution Control District, September, 1962, 14 pp.

The method and apparatus for crystalline iodine collection of small amounts of TEL, TML, and other organo-Pb vapors from the air are described. The air is sampled at 1.5 ft^3/min, for 1 hr. Following the collection of the samples in iodine, a double extraction with dithizone is employed to eliminate interfering ions. The color of the final extraction is measured spectrophotometrically. The mean error for the combined processes of preparing and recovering known samples of Pb within the range of 1.5-4.6 μg Pb/m^3 was 0.4, with a standard error of estimate of 0.6 $\mu g/m^3$.

Atmospheric organic Pb, measured in Los Angeles from Mar.-Apr., 1962, ranged from 0.0-2.2 $\mu g/m^3$. The samples were collected in a 4-wk period from a 6th floor level window above an alley. All samples were taken in the morning, except 5 which were collected in early afternoon, in typical spring weather.

3355 Mueller, P.K., Helwig, H.L., Alcocer, A.E., Gong, W.K., and Jones, E.E. (California Dept. Publ. Health, Berkeley): CONCENTRATION OF FINE PARTICLES AND LEAD IN CAR EXHAUST. American Society for Testing and Materials, Special Technical Publication No. 352:60-73; discussion, 74-7, 1962.

A study was made of several new sampling methods concerning the concentration of fine particles and their Pb content in the exhaust of several cars operated under cruising conditions and of the effects of car, speed, and type of Pb antiknock fuel additive on these concentrations. Three makes and models of cars, 3 speeds, 25, 45, and 60 mph, and 2 Pb antiknock additives (3 ml/gal of either TEL or TML (3.18 g Pb/gal)) were selected. Fine particle concentrations and concentrations of Pb found in the fine particles per unit volume of auto exhaust were not significantly affected by variations in car, speed, TEL and TML fuel additives. The average concentration of fine particles <2 μ was 32 μg/l of exhaust and the average Pb concentration found in these particles was 13 μg/l of exhaust. The exhaust particulates contained 62-80% by weight of particles <2 μ under cruising conditions: >68% by weight of the fine particles were <0.3 μ. The average Pb content of all particulate samples obtained was ~40%. Variations in this value among individual tests resulted from an interaction between speed and car. This observation suggests a method for studying the effect of car variables on particulate exhaust emissions, using Pb as a tracer. The Pb content appeared to be independent of particle size when averages of broad size ranges were compared. This observation can be utilized for estimating the maximum contribution of auto exhaust aerosol to atmospheric aerosol.

In a discussion following the article, D.A. Hirschler (Ethyl Corp., Detroit, Mich.) reviewed some of his own studies (Industrial and Engineering Chemistry 49:1131-42, 1957), the results of which were not in as close agreement with Mueller's results as he would like to see them. His work indicated that from 1/2 to 2/3 of the Pb exhausted under typical city driving conditions is <5 μ and 4-12% <1 μ. The fact that his results differ from those of the present authors points out the difficult nature of this type of work and the important effects that different approaches to particle collection and classification may have. Although the methods used by Mueller and coworkers have much to recommend them, the difficult problem remains of adapting these methods to driving conditions which are entirely representative. For this, the problem is that of sampling.

To this Mueller replied that Hirschler presented data obtained from cars operated at a city driving cycle and using a total sampling procedure followed by sedimentation analysis of the particulate sample resuspended in a liquid. In contrast, his data were obtained under cruising conditions using size selective sampling methods. Also the tests were conducted on an all-weather chassis dynamometer. However, neither unrealistically high undercar temperatures nor the sampling method could account for the differences in size distributions found by the two groups of investigators. Mueller believes that his process of sampling minimizes the risk of changing the nature of the particles.

3356 Pavlićević, M.: (FATAL PARALYSIS IN LAMBS RESULTING FROM POISONING WITH INDUSTRIAL FUMES.) Vet. Glasn. 16:1085-8, 1962.

The disease occurred in the vicinity of a Pb smelting plant. First cases were noted during early spring when the snow which had been exposed to fumes all winter began to melt, leaving considerable Pb deposits on roofs and soil. The disease was typical of Pb poisoning. Cheese made from ewes' milk contained 132 μg% Pb. (From Veterinary Bulletin 33:Abstract No. 1692, 1963)

3357 Petrilli, F.L., and Kanitz, S. (Univ. Genoa, Italy): Osservazioni sull'inquinamento dell'aria derivante dall'uso di antidetonanti a base di piombo nelle benzine. (CONTAMINATION OF THE AIR FROM THE USE OF LEAD-BASED ANTIKNOCK AGENTS IN GASOLINE.) Giornale di Igiene e Medicina Preventiva 2:107-15 (Apr.-June), 1962.

In order to study the potential risks from gasolines containing TML or TEL, air samples were collected over a period of >1 yr near 4 service stations and in the streets at different distances around motor vehicles. Where TML-containing gasoline was served, the atmospheric dust contained 3.32 and 3.6 μg organic Pb plus 3.90 and 3.82 μg inorganic Pb/m^3; with TEL-containing gasoline these values were 3.15 and 4.04, and 4.25 and 4.79. After 70 l. had been served, the ambient air concentration of organic Pb within 150 m^3 ranged from 2.3-3.1 $\mu g/m^3$ for TML-gasoline and 2.1-2.9 $\mu g/m^3$ for TEL-gasoline. Atmospheric Pb concentrations contributed by exhaust gases ≦3 m behind vehicles were 2-60 $\mu g/m^3$ and 1-62 $\mu g/m^3$, respectively. Pb levels of blood and urine were normal in the service station attendants. Experiments with animals (mice, rats, rabbits, etc) showed that TML was somewhat less toxic: LD_{50} values in mice weighing 20 g after 10 min exposure to TML or TEL were 14.11 and 6.03 ppm, respectively; however, animals died more quickly after TEL. Aside from this difference, there were some differences in the symptomatology of the poisoning. Changes found in liver, lungs, kidneys and central nervous system in acute and chronic intoxication were similar. TML contains 77% Pb, TEL 64%; the vapor pressure of TML is 60 times greater than that of TEL. It is concluded that no particular risk is created when TML is used as antiknock agent in concentrations of the same order as TEL.

3358 Robinson, A.J., Specht, C.A., and Albert, C.G.: REDUCING AIR POLLUTION FROM ENGINES OPERATED ON LEADED FUEL. US Patent 3,025-133, Mar. 13, 1962.

A method is described for using Pb-susceptible oxidation catalysts by pretreating the engine exhaust with granules of aluminosilicate activated with phosphoric acid to convert the Pb compounds to Pb materials of low volatility. (From Chemical Abstracts 57:1196, 1962)

3359 Rozsa, J.T., Stone, J., and Schruefer, J. (Natl. Spectrograph. Lab., Cleveland, O.): AIR MONITORING FOR LEAD AND BERYLLIUM. American Industrial Hygiene Association Conference Abstracts 1962, p. 73.

Air sampling is accomplished by collection of particulate matter on a filter medium contained in a coupon mounting. Rapid analysis of the coupons is made by a direct reading emission spectrograph. The concentration range covers normal-toxic conditions.

3360 Ryazanov, V.A. (Inst. Higher Med. Educ., Moscow, USSR): SENSORY PHYSIOLOGY AS BASIS FOR AIR QUALITY STANDARDS. THE APPROACH USED IN THE SOVIET UNION. Archives of Environmental Health 5:480-94 (Nov.), 1962.

The methods used in the USSR for the establishment of MAC for a single exposure to air pollutants are discussed. The 1st index considered is that of levels causing reflexive reaction of the respiratory organs (including the nose) upon a single exposure. The method of optical chronaxy determination was used widely, and correlated with odor detection threshold. As the chronaxy method proved insufficiently sensitive, the procedure was changed to the study of the visual adaptation to darkness and light sensitivity. In studying subsensory reactions, EEG's are followed for determining rhythm assimilation.

Application of these methods to various substances for which MAC's have been established is discussed. Among the MAC's those for Pb and its compounds and of Pb sulfide (as Pb) are 0.0007 and 0.0017 mg/m^3 during 24 hr, respectively. In the discussion, the author mentions that in the USSR Pb is considered to be more toxic than in the USA. Experiments with children in the USSR showed that coproporphyrinuria and accumulation of Pb in the bones occurred at exposure to 1 μg Pb/m^3 but were absent at exposure to lower doses of Pb.

3361 Savraeva, K.E., and Bogatyrev, M.F.: (ELECTRIC FILTER PURIFICATION OF PROCESSING GASES FROM THE UST-KAMENOGORSK LEAD FACTORY.) Sb. Nauchn. Tr. Vses. Nauchn. Issled. Gorno met. Inst. Tsvetn. Metal. 1962, No. 7:226-40.

The dependence of the specific electric resistance of Pb dusts on the temperature and moisture content of the gas was studied. (Ref. Zh., Met., Abstract 2G217, 1963; Chemical Abstracts 59:6892, 1963)

3362 Smokotnina, T.N. (Div. Public Hyg. Kazakh Med. Inst., USSR): Gigienicheskaya otsenka zagryazneniya atmosfernogo vozdukha vybrosami svintsovogo zavoda. (HYGIENIC EVALUATION OF AIR POLLUTION WITH WASTES FROM A LEAD FACTORY.) Gigiena i Sanitariya 27:87-90 (June), 1962.

From 1959-1960 an investigation was conducted of the effluents discharged by a Pb refining factory. Fly ash emitted at stack height of 75 m amounted up to 0.4 g/m^3, the Pb content of which was up to 0.2 g/m^3. Aside from Pb, As and S gases were also determined at various distances from the factory (polarographic method for As and Pb) at 1.5 m above ground, and at 40 km distance for control. The following average concentrations were found at the factory site, at 0.5, 1, 1.5, and 5 km from the factory, in mg/m^3: Pb, 1.17, 0.22, 0.14, 0.103, and 0.014; S, 7.6, 5.4, 3.5, 2.4, and 0.7; As, 0.29, 0.077, 0.06, 0.0055, and 0.0014 (at 3 km). An inquiry made of 1000 persons who lived at various distances from the factory brought forth complaints of disagreeable odors by all who lived within 2 km, and by 66% of those who lived 5 km away. At a distance of 0.5 km, 75% complained of dusts getting into their eyes; 100% at 1-km distance complained also that it was impossible to air their dwellings. At 5 km from the factory complaints as to the latter were voiced by only 19%. Pb and As were also determined in the soil at the distances stated above and were found in the following average concentrations at the surface and at 0.25-m depth, respectively, in mg/100 g: Pb, 5546.6 and 3143.3; 1156 and 458; 613 and 430; 369 and 340, and 88.5 and 43.0. As concentrations ranged from 160 and 78.5 to 11.0 and 8.5 mg/100 g.

In order to determine the effects of such pollution, 5 groups of 6 rabbits each were placed at distances of 0.5, 1, 1.5, 5, and 40 km from the factory. All rabbits were fed feed from a clean area and given Pb-free water. After 100 days the animals were sacrificed and the organs were analyzed for Pb by a spectrographic method. The average Pb contents, in mg/100 g wet tissue, were as follows: in bone, 10.9407, 8.2187, 3.8935, 3.2362, and 1.0799; in liver, 1.2870, 0.3863, 0.2293, 0.2202, and 0.0867; in muscle, 0.3547, 0.1816, 0.1319, 0.0572, and 0.0188. On the basis of these findings, the author considers that the 1-km protective zone specified in the regulations for nonferrous factories is not sufficient, and that no <5 km should be allowed.

3363 Timofeeva, L.V., Moskvicheva, T.V., Komarova, A.P., Gobunova, K.N., and Kochurov, V.A.: (CONTAMINATION OF THE ATMOSPHERE IN

KIROVOGRAD BY INDUSTRIAL WASTES AND THEIR EFFECT ON THE HEALTH OF CHILDREN.) Materialy 2-oi (Vtoroi) Nauchn.-Prakt. Konf. Sverdl. Gor. i Oblastn. Sanit.-Epidemiol. St., Sverdlovsk, Sb. 1962:5-18.

Dusts of Pb, As, and SO_2 and vapors of H_2SO_4, Cl_2, and HCl in concentrations considerably exceeding the maximum permissible were found in the atmosphere around the Kirovograd Cu smelting plant and solid alloy factory. Concentrations were highest within a radius of 0.5-1.5 km from the factory. The frequency of infectious diseases and diseases of the respiratory tract and of death was higher than in controls. (From Ref. Zhur., Khim. 1963, Abstr. No. 131263; Chemical Abstracts 60:13782, 1964)

3364 U.S. Public Health Service, Division of Air Pollution: MOTOR VEHICLES, AIR POLLUTION, AND HEALTH. A REPORT OF THE SURGEON GENERAL TO THE U.S. CONGRESS (87th, 2nd Session) IN COMPLIANCE WITH PUBLIC LAW 86-493. THE SCHENCK ACT. House Document No. 489. Washington, D.C., U.S. Government Printing Office, 1962, 459 pp.

In this report the problem of Pb as air pollutant is dealt with on pp 141-8. In order to evaluate the public health hazard created by the use of TEL and TML as additives in gasoline, the research conducted on environmental levels of Pb, on animal and human exposure to Pb and its accumulation in tissues, is reviewed. It is concluded that the maximal atmospheric levels of Pb currently observed have been much too low to produce clinical evidence of Pb poisoning. However, problems regarding the level of human tolerance to additional continuous daily exposure to Pb resulting from vehicular and nonvehicular sources, remain unsolved.

3365 Warren, H.V., and Delavault, R.E. (Univ. Brit. Columbia, Vancouver, Canada): LEAD IN SOME FOOD CROPS AND TREES. Journal of the Science of Food and Agriculture 13: 96-8 (Feb.), 1962.

The Pb content of some cereals and vegetables grown in various parts of Great Britain and British Columbia was determined. Average Pb values (ppm) in samples taken in British Columbia within 300 yards of a well-travelled highway and in Great Britain where they were either subjected to Pb pollution or grown on soils abnormally high in Pb ranged from 1-5 and 0.6-11, respectively. Dry 1st-yr stems of well known trees, collected at London suburbs where traffic was heavy, and at a district of Sussex, remote from automobile traffic, contained 2-32 and 0.3-2.0 ppm Pb, respectively. It is suggested that normal Pb content of food products, and of leaves and twigs of deciduous and evergreen trees (oven dried), be taken as 0.1-1.0 ppm and up to 2.5 ppm, respectively. Higher Pb values may be assumed to be abnormal, and to have been caused by geological anomalies or by pollution.

3366 World Health Organization: AIR POLLUTION IN EUROPE. WHO Chronicle 16:413-4 (Nov.), 1962.

Pointing out first that it is not yet possible to establish definitely what pollutant of the many different combinations in the air of cities are responsible for causing specific illnesses or aggravating existing disease, the Symposium organized by the WHO Regional Office for Europe, which dealt with the problem of agreement on measurable indices of pollution and of disease, is briefly reviewed. Pb was included in the presentations and discussions.

1963

3367 Astolfi, E. (Soc. of Legal Med. and Toxicol., Buenos Aires, Argentina): Realidad del problema toxicologico en la infancia. (PROBLEMS OF POISONING IN CHILDREN.) Semana Medica 123:1670-3 (Nov. 21), 1963.

Data on poisoning in children and adults, caused by common household and industrial poisons, are discussed. Among other opportunities for poisoning, a number of cases of Pb poisoning in the vicinity of a factory emitting Pb fumes, at La Tablada, are mentioned. After the occurrence of Pb encephalopathy in an infant, numerous other cases of Pb poisoning in children and adults were discovered. A fetus originating from a spontaneous abortion and the placenta of the dead mother were found to contain large amounts of Pb. Possibly this death was also due to Pb poisoning.

3368 Berge, H.: Phytotoxische Immissionen (Gas-, Rauch- und Staubschäden). (PHYTOTOXIC EMISSIONS (GAS, SMOKE, AND DUST DAMAGE).) Berlin, Paul Parey, 1963, 100 pp.

The Immissions of modern industrial civilization and the resulting atmospheric pollution by gases, vapors, smoke, fog, fumes, smog, dust and ash causing direct and indirect acute and chronic microscopic and macroscopic damage and disease to plant life are dealt with in great detail. The origin of pollution is of great importance in assessing the potential damage to the vegetation. It is recommended that the amount of industrial activities which emit harmful elements and compounds be reduced to a nonhazardous minimum. In the case of Pb, the author conducted tests in which plants were exposed to dust containing Pb carbonate, Pb oxide and Pb sulfate. It was shown that these metal dusts have little or no direct or indirect harmful effect on vegetation. Decisive for any positive or negative effect of these dusts, besides the amount of dust and duration of exposure, are environmental factors such as location and surroundings and, of course, the condition of the plant itself.

3369 Coghi, L., and Bellelli, E. (Univ. Parma, Italy): Ricerche sull'inquinamento dell' aria da parte di uno stabilimento di produzione di piombotetraetile. (RESEARCH ON AIR POLLUTION BY A TETRAETHYLLEAD PRODUCTION PLANT.) Nuovi Annali d'Igiene e Microbiologia 14:207-24 (May-June), 1963.

Air samples were collected in the neighborhood of a factory near the little town Fidenza, producing TEL. Analysis of 25 samples in the area adjacent to the factory gave the following Pb concentrations, in $\mu g/m^3$ of air: 200-500 in 6 samples, 100-199 in 5, 50-99 in 6, 10-49 in 6, <10 in 1, absent in 1. In the residential area of the town of 15,000 inhabitants the distribution and concentration of Pb was as follows: (µg/m^3 of air): 50-100 in 3 samples, 10-49 in 3, <10 or absent in 6. Blood tests were made in 30 subjects who were employed in 3 industries adjacent to the factory for TEL or at the railway station close by. The Pb levels in the blood of these workers ranged from 20.18-297.6 µg Pb (av 113)/100 ml, while in 14 control subjects not exposed to Pb inhalation the corresponding values were 24.20-71.42 (av 53).

The authors conclude that the concentrations of Pb in air were greatly higher than tolerable, and note that in US, recently proposed control programs provide for Pb concentrations ≤5-7 µg/m^3 of air.

3370 Fatzer, R. (Wädenswil, Switzerland): Zur Diagnose und Therapie der Bleivergiftungen. (THE DIAGNOSIS AND THERAPY OF LEAD POISONING.) Therapiewoche 13:408-11, 1963.

The author sets out by stating that Pb poisoning is as old as the human race, since it has existed in the earliest antiquity through use of the metal in cooking utensils, as sweetening agent (Pb acetate), cosmetics, and other applications. He does not mention the possible magnitude of the intake from these sources but enters into just a brief discussion of the possibility of Pb poisoning by the use of TEL as antiknock agent in gasoline, whereby "millions of tons of Pb are released yearly..." as much as "510 tons yearly in small Switzerland..." (as calculated by Jecklin a few years ago, who found 850 g Pb/m^3 of street dust in Basel). He also points out that some, of whom Kehoe is an exponent, believe that the threshold limit of human tolerance has by far not been reached whereas others emphasize that the blood-Pb level has increased to the point that the toxic limit of 0.06 mg% has by now been exceeded. He holds the economic and financial factors as playing a role in the first complacent point of view. He then reports two cases of Pb poisoning from his own experience. The first of these cases was that of a chauffeur, referred to the author (a dentist) by a physician friend of his. The patient suffered from a severe inflammation of the gums besides having intestinal troubles, insomnia, fatigue and pains in the joints and back. He stated that he often was aware of an odor of gasoline in the cab. After treatment with EDTA, the gingival inflammation subsided and his general health improved. No blood tests were made because the author did not consider them as conclusive and because the costs would have been prohibitive for the patient since no insurance would have accepted a diagnosis of Pb poisoning. The 2nd case was that of the wife of a garage owner who suffered from eczema. Since there was a suspicion of chronic TEL poisoning, EDTA therapy was tried and proved successful.

The author points out that pyorrhea is not considered as a symptom of Pb poisoning by the Swiss Federal Commission of Leaded Gasoline although Koelsch (1959), Cimasoni and Oltramare (1960) have shown it as such. He points further to Pletscher (1955) and others, who found that Pb levels in blood were not always abnormally raised in massive Pb intoxication and that the mobilization test with EDTA is indispensable for the diagnosis of Pb poisoning; to the fact that Pb is deposited in bone to be withdrawn from it years later by various illnesses, old-age degeneration, giving rise to "convenient diagnosis of senile manifestations"; also to findings by a number of authors of an involvement of the vascular system in Pb poisoning particularly so since recently it was shown that greatest deposition of Pb is in the aorta, as well as to a possible connection between multiple sclerosis and chronic Pb poisoning. The author further quotes the "Technical Reports of California Standards for Ambient Air Quality and Motor Vehicle Exhaust" in which it is stated that, assuming man inhales daily 15 m^3 air, the threshold for Pb in air should be set at 0.006 mg/m^3 air. This value is 25 times lower than the one established by Kehoe (1962).

In conclusion, by pointing to differences of action of inorganic versus organic Pb compounds and that inhaled Pb is 10-100 times as toxic as the ingested, the author demands that Pb-containing antiknock agents be forbidden and that legislation concerning Pb be revised.

3371 Feldstein, M. (Bay Area Air Pollut. Control Distr., San Francisco, Calif.): TOXICITY OF AIR POLLUTANTS. Progress in Chemical Toxicology 1:297-316, 1963.

The toxicity of air pollutants is discussed with respect to the major differences between occupational exposure which generally occurs for an 8-hr period during 5 days/wk, with adult male populations, and exposure of the general population which involves the young, the aged and the ill populations exposed to continuing exposure of air pollutants. Pb is one among a number of air pollutants discussed. The MAC for exposed workers has been set at 200 µg/m^3 air. The average national value of Pb in the air has been reported as 1.4 µg/m^3, with values ranging from 0.1 µg in rural areas to <3.5 µg/m^3 in populated areas. The toxicity of Pb in the atmosphere is greatly influenced by the particle size distribution. Exposure to community levels of Pb is estimated by comparing Pb levels in blood and urine in exposed and control groups, with higher levels found in urban residents and those with occupational exposure to auto exhaust than in persons living in rural areas. Blood Pb levels >80 µg/100 g of blood indicated incipient Pb intoxication. Additional sources of exposure to Pb are cigarette smoking, food and beverage intake and occupational exposures. Intake from these various sources may in some cases result in increased Pb storage and chronic toxicity. Further community studies are in progress.

3372 Hofer, L.J.E., Shultz, J.F., and Feenan, J.J.: EFFECT OF LEAD DEPOSITS ON ACTIVITY OF AUTOMOTIVE EXHAUST CATALYSTS. U.S. Bureau of Mines Report of Investigations 6243, 1963, 22 pp.

The effect of particulate Pb in the exhaust gases of internal combustion engines on the activity of oxidation catalysts was studied. These catalysts destroy the hydrocarbon and CO in these exhausts.

For this study 3 catalysts were chosen in addition to the γ-alumina support, among which chromia-on-alumina (Cr-on-Al) proved to be the most active both before and after poisoning. The catalysts were subjected to an amount of Pb corresponding to a 20,000-mi trip using gasoline containing 3 ml TEL/gal. The pure alumina catalyst was treated only with the exhaust corresponding to a 10,000-mi test. Approximately half the Pb was deposited on the catalyst; the rest probably deposited on the engine, crankcase oil, and exhaust pipe, or escaped into the atmosphere. The Pb gradients were such as to suggest that only a minor portion of the Pb escaped into the atmosphere. X-ray powder diffraction analysis showed that the Pb deposits were in the forms of $PbSO_4$, $PbSO_4.PbO$, and $Pb(Br,Cl)_2$.

All the catalysts were adversely affected by the Pb deposit. The Cr-on-Al catalyst was least adversely affected, requiring an increased temperature of only 100°C to maintain the same conversion observed in the fresh catalyst. The catalysts were relatively more effective in oxidation of isopentane than in oxidation of CO. Because the isopentane is one of the hydrocarbons most difficult to oxidize, it may be concluded that the catalysts are considerably more effective for the oxidation of hydrocarbons than for the oxidation of CO.

3373 Holtzman, R.B. (Argonne Natl. Lab., Ill.): THE Pb^{210} (RaD) CONCENTRATIONS OF SOME BIOLOGICAL MATERIALS FROM ARCTIC REGIONS. US Atomic Energy Commission Document No. ANL-6769, 1963, pp. 59-65.

Data are presented on the ^{210}Pb content of some biological specimens from the arctic; lichens from Finland and Alaska; the stomach contents of some caribou; a Finnish water plant used for fodder (Equisetum flaviatile); antler, meat and bone from reindeer and caribou; and bones from an Icelandic lamb. For comparison some measurements of grass from Chicago are shown. ^{210}Pb was determined by first wet ashing the samples in nitric and perchloric acids, removing the nitrates by repeated fumings with HCl and plating the ^{210}Pb decay product on a silver disk which was then α-counted. Concentrations of ^{210}Pb in pCi/g dry weight were found as follows: lichens, 8.29-61.2; grass in Chicago, 0.128-0.819 (in decreasing order from root to stem); reindeer and caribou meat, 0.174-0.366; bones (per g ash) of reindeer and caribou, 5.00-13.8, of lamb, 0.269-0.353.

3374 Jacobi, W., and André, K. (Hahn-Meitner Inst. Nuclear Res., Berlin, Germany): THE VERTICAL DISTRIBUTION OF RADON 222, RADON 220 AND THEIR DECAY PRODUCTS IN THE ATMOSPHERE. J. Geophys. Res. 68:3799-3814 (July), 1963.

The vertical equilibrium distributions of ^{222}Rn, ^{220}Rn, and their decay products in a horizontally isotropic atmosphere are calculated from diffusion theory with the help of a digital computer. The change of the turbulent diffusion coefficient with altitude and the removal of ^{210}Pb and ^{210}Po by fallout were taken into account. Vertical profiles of the natural radionuclides in the atmosphere are presented for several typical profiles of the turbulent diffusion coefficient. Agreement with available experimental data is rather good. The results indicate the importance of the natural radioactive tracers in the study of mixing processes in the troposphere and in the mechanism of transport from the troposphere into the lower stratosphere. (From Nuclear Science Abstracts 17:Abstr. No. 30700, 1963)

3375 Jaworowski, Z. (Inst. Badan Jadrowych, Warsaw, Poland): CORRELATION BETWEEN THE CONCENTRATIONS OF LEAD-210 (RADIUM D) AND CESIUM-137 IN GLACIER ICE. Nukleonika 8, No. 12:553-5, 1962.

^{210}Pb and ^{137}Cs were estimated in ice samples collected from a Tatra glacier, and the results compared to the data obtained for rain water in 1952, 1956, 1958, and 1959. Annual changes in ^{210}Pb concentration were roughly consistent with those found for ^{137}Cs, as well as with the literature data of ^{90}Sr concentration in rain water. For the years investigated results (ranges) in pCi were: rainwater: ^{210}Pb 2.3-8.5, ^{90}Sr 4.6-29.43; ice: ^{210}Pb 2.4-23.1, ^{137}Cs 4.7-24.5. Observed increase of ^{210}Pb concentration was concluded to be caused by the nuclear tests, either by hastening the fallout of the natural ^{210}Pb from the stratosphere or by partial formation of ^{210}Pb in the explosion.

3376 Kehoe, R.A. (Univ. Cincinnati, O.): THE HYGIENIC ASPECTS OF THE PRODUCTION AND USE OF LEAD ANTIKNOCK COMPOUNDS. Journal of the Air Pollution Control Association 13:314-21 (July), 1963.

The following topics are discussed: Air pollution from plants engaged in the manufacture of Pb alkyls; air pollution in connection with the transportation, storage, and handling of concentrated antiknock compounds; pollution of the ambient atmosphere of urban areas with Pb alkyls derived from the commercial distribution and use of leaded gasoline as motor fuel; pollution of the ambient atmosphere of urban areas with Pb from the exhausts of automobiles; Pb in the atmosphere of American cities; sources of Pb in urban atmosphere; Pb in the environmeat of the American population - absorption, excretion, and accumulation; absorption and excretion of Pb under "abnormal" conditions of exposure; standard for the quality of air with respect to the concentration of Pb. The discussion and conclusions are based on the author's experience in industry and experiments with human subjects. Concerning the development of a standard for the quality of air with respect to the concentration of Pb, based on above experiments, " the available facts indicate clearly that no public threat is posed by the Pb in our cities; that we are able to recognize such a threat well in advance of its possible materialization," as well as satisfactory experimental means for obtaining the information required to establish a standard. On present evidence the best that can be done is to select some point between 75 $\mu g/m^3$ which is too high, and the range of 1-6 $\mu g/m^3$ which is too low. Kehoe cautions against accepting the written record of a number as being authoritative at this stage and emphasizes the importance of particle size in considering standards. (25 references)

3377 Korth, M.S. (Robert A. Taft Sanit. Eng. Center, Cincinnati, O.): DYNAMIC IRRADIATION CHAMBER TESTS OF AUTOMOTIVE EXHAUST. US Dept. of Health, Education and Welfare, Public Health Service Publication No. 999-AP-5, Nov., 1963, 53 pp.

As part of an intensive study by government and private agencies the US Public Health Service built an irradiation chamber facility for investigation of irradiated auto exhaust under mixing conditions similar to those in the atmosphere. The facility consisted of a programmed continuous-cycling chassis dynamometer, an exhaust dilution system, a dilution-air purification system, 2 irradiation chambers, and exposure facilities. Three variables were considered: (1) initial exhaust concentration (~13 ppm C and 35 ppm C), (2) average irradiation time (85 and 120 min), and (3) fuel composition (14% and 23% olefins). The effects of varying these test parameters were determined by use of appropriate test criteria including NO_2 formation rate, oxidant production, total hydrocarbon losses and reaction of specific species, aldehyde production, plant damage, and bacteria kill. In the tests described fuels containing 0.53 and 1.38 ml TEL/gal were used.

Of the 3 variables studied during the 1st test series, the exhaust concentration at the start of irradiation appeared to produce the most significant effects. Fuel composition had a lesser influence. Very little difference was noted in the effects produced at 2 different average irradiation times.

3378 Mutschlecner, J.P. (Univ. Michigan, Ann Arbor): THE ABUNDANCE OF LITHIUM, BERYLLIUM, AND LEAD IN THE SOLAR ATMOSPHERE. Dissertation, University of Michigan, 1963.

Computer programs and measurement techniques applicable to the determination of abundances of elements in the solar atmosphere were developed. The number of atoms per million silicon atoms were found to be 1.1 for Li, 6.9 for Be and 1.4 for Pb. The Pb abundance lends support to the s-process theory of nucleogenesis. (From Dissertation Abstracts 24, No. 7:2651, 1964)

3379 Osborne, R.V. (Royal Cancer Hosp., London, England): PLUTONIUM-239 AND OTHER NUCLIDES IN GROUND-LEVEL AIR AND HUMAN LUNGS DURING SPRING 1962. Nature 199:143-6 (July 13), 1963.

Samples of dust from ground-level air at Sutton, Surrey, were collected on the plates of an electrostatic precipitator. By following the long-term build-up of total α-activity in these dust samples, the concentration of ^{210}Pb in air and the ratio of ^{210}Po activity to ^{210}Pb activity were estimated. The following results were obtained for samples taken in February, March, April, May and June 1962, respectively: ^{210}Pb, in 10^{-15}Ci/kg air, 3.3, 2.0, 3.3, 3.2, 3.9; $^{210}Po/^{210}Pb$, 0.24, 0.48, 0.21, 0.15, 0.09.

3380 Picciotto, E., and Wilgain, S. (Univ. Libre, Brussels, Belgium): FISSION PRODUCTS IN ANTARCTIC SNOW, A REFERENCE LEVEL FOR MEASURING ACCUMULATION. Journal of Geophysical Research 68:5965-72 (Nov. 1), 1963.

In the area around King Baudouin Station (70° South, 24° East), it is shown that a reference horizon, easy to identify, was formed by the stratospheric fallout of radioactive debris from thermonuclear bomb tests. Gross β-activity and ^{90}Sr were measured in snow and firn samples from 1935-1960. The contribution of natural radionuclides is negligible, and the gross β-activity can be taken as a measure of the fission-products concentration. A sharp 10-fold increase in the β-activity at the beginning of 1955 is attributed to the sudden release in the Antarctic troposphere of fission products from the Castle thermonuclear tests series (March, 1954). The previous and 1st thermonuclear test (Ivy, 1952) is less marked. The β-activity before 1952 is essentially due to ^{210}Pb and ^{40}K. There are indications that this radioactive horizon has been formed at the same time over the whole ice cap, but direct checks are needed on more, well-dated firn profiles. (From authors' summary)

3381 Princi, F. (Univ. Cincinnati, O.): AIR POLLUTION--FACTS AND FABLES. Journal of Occupational Medicine 5:461-7 (Oct.), 1963.

The author points out that air pollution problems cannot be remedied without a reasonable understanding of both environment and man. Before any activity can be instigated to eliminate this pollution, one must have facts that define the characteristics of a clean atmosphere and concerning which most reasonable persons can agree. This can be accomplished only when facts and their interpretation are not confused with fables. The author discusses 8 fables of air pollution. Fable No. 7, in which Pb is mentioned, is: "The automobile is wholly responsible for our unclean air. Many well and poorly defined materials are emitted from engine exhausts, and the population is being poisoned in some insidious fashion." To show the unreasonableness of this statement, the author explains that few pollutants have been studied as extensively as automobile exhausts, the chemicals emitted therefrom being products of gasoline and its additives. One additive, Pb, is well known and its action understood. Quantities of Pb introduced into the atmosphere from automobile exhausts have been proved insignificant through clinical and laboratory data. The author further states this does not mean, however, that automobile exhausts do not contribute to air pollution, but it does mean that all the facts are not known yet. (40 references)

3382 Robinson, E., Ludwig, F.L., DeVries, J.E., and Hopkins, T.E. (Stanford Res. Inst., Menlo Park, Calif.): VARIATIONS OF ATMOSPHERIC LEAD CONCENTRATIONS AND TYPE WITH PARTICLE SIZE. Stanford Research Institute Project No. PA-4211, Final Report, November 1, 1963, 80 pp.

A technique to determine the size distribution of the atmospheric Pb aerosol was developed. A modified Goetz Aerosol Spectrometer was used and the analysis procedure was similar to cumulative sedimentation methods of particle size determination. On the basis of data obtained for field samples in the San Francisco Bay Area and the Los Angeles basin, a typical size distribution for the Pb aerosol would be one with a mass median equivalent diameter of 0.20 µ with 25% of the mass being accounted for by particles with an equivalent diameter of <0.1 µ and another 25% of the mass in particles >0.5 µ. The principal source of the Pb aerosol in these tests was automobile exhaust. The various compound constituents which make up the atmospheric Pb aerosol could not be determined. The fraction composed of water-soluble compounds averaged a solubility from <1-18%. The data indicate that the more soluble Pb salts such as the chloride, bromide and sulfate are probably minor constituents of the Pb aerosol.

3383 Stöfen, D. (Cons. Eng. Montabaur, Germany): Die Verunreinigung der atmosphärischen Luft mit Blei und ihr Einfluss auf die Gesundheit der Bevölkerung. (POLLUTION OF ATMOSPHERIC AIR WITH LEAD AND ITS INFLUENCE ON THE HEALTH OF THE POPULATION.) Zentralblatt für Arbeitsmedizin und Arbeitsschutz 13:39-40 (Feb.), 1963.

The author reviews in part a paper by A.S. Zykova, (1957), pointing out the following facts: that Pb was found in the USSR in 73-79% of all air samples collected in the vicinity of a storage battery plant and a tin smelter, the discharge for these 2 industries amounting to 5.7 and 14.7 kg/24 hr, respectively. The average Pb concentrations in the atmosphere at distances of 500-700 m from the battery plant were 3-4 times higher than the MAC of 0.0007 mg/m^3, and at a distance of 1500 m from the tin smelter 5-6 times higher. The Pb penetrating from the outside air into dwellings exceeded the MAC 3-5-fold, and concentrated in the dust as found by analyses. People who had lived for some time in a Pb-polluted atmosphere showed a tendency to a higher incidence of diseases of the digestive, cardiovascular and nervous system, as compared with a control group. In many cases, their urinary Pb levels were indicative of Pb absorption. Analyses of tissues of chickens demonstrated that Pb accumulates in the organism.

The reviewer points out Zykova's recommendation that protective zones around the Pb-discharging plants be created, and states that this had been considered in the German Federal Republic, but has not yet been realized. He goes on with a review of a paper by the German authors Drummen and Reinl (1962) who reported Pb poisoning in 3 children who had lived in a house close to a Pb foundry. Stöfen reports an additional case from his own experience which occurred in a child living close to another Pb foundry. The child had a Pb level in the blood of 100 µg%, urinary CP of 520 µg% and displayed the characteristic brain involvement. Although Stöfen wonders why Zykova did not investigate the health of children and of persons >50 yr old, her investigation does point to the fact that the risk of Pb poisoning in a population living in areas where Pb is discharged is much greater than previously expected. The electrofilters mentioned by Zykova are not used by many Pb smelters in Germany which lack even effective control of the S effluents. From the economic standpoint it does not appear possible to apply the Soviet MAC values for residential areas or to establish protective zones. Stöfen suggests that the Department of Public Health of the German Federal Republic investigate the extent of the health hazards. In order to avoid apprehension on the part of the people, such studies (blood and urine analyses) should be carried out by the Sick Funds in an inconspicuous manner. This might involve a change of the Federal compensation laws (RVO). Furthermore, all suspected cases should be reported. Since Pb salts are used as abortive agents, the possible effect of Pb effluents on the fetus should be investigated. Effects by effluents of Pb smelters, such as acidification of the soil by SO_2 and Pb accumulation in the soil with all its implications, effects on forests, all plants, domestic and wild animals aside from man, are mentioned. Emphasis is laid on the need of protecting the child and the embryo. It is also indicated that workers of Pb foundries live as far away from their work as possible so that they are not exposed to Pb also at times when they are away from work.

3384 Tatsumoto, M., and Patterson, C.C. (US Geol. Surv., Denver, Colo.): CONCENTRATION OF COMMON LEAD IN SOME ATLANTIC AND MEDITERRANEAN WATERS AND IN SNOW. Nature 199:350-2, 1963.

Samples of Atlantic and Mediterranean waters were obtained from 5 stations and at various depths from each station. Snow was collected from the Lassen Volcanic National Park and Pb was determined by an isotope dilution procedure. The SiO_2 content of the snow samples was also determined and used as an index of the silicate dust concentration. At depths from 2725-5134 m, Pb concentration in sea water ranged from 0.02-0.20 µg/l. Measurement of the isotopic composition of Pb in snow gave the following ratios: 206/204, 18.01; 206/207, 1.144; 206/208, 0.469. In discussing the results and the sources of Pb, the authors conclude that amounts of additional Pb introduced into oceans by agricultural activity is only ~1/10 of Pb contributed by TEL and other industrial Pb compounds.

3385 Tatsumoto, M., and Patterson, C.C. (California Inst. Technol., Pasadena): THE CONCENTRATION OF COMMON LEAD IN SEA WATER. In Nuclear Geophysics, Proceedings of a Conference, Woods Hole, Mass., June 7-9, 1962. National Academy of Sciences-National Research Council, Publication 1075, 1963, pp. 167-75.

As discussed by Patterson, unfiltered samples of sea water taken off the coast of S. California show an abrupt decrease in Pb concentration from surface to deep water. Surface water Pb concs ranged between 0.1 and 0.4 µg/l. Deeper waters had Pb concs of 0.02 µg/l. The origin of the high surface Pb concentrations is discussed in terms of run-off of rivers and is attributed to mining and processing of Pb for TEL which is converted to aerosols with ~100% efficiency, thus finally reaching ocean waters.

3386 Tatsumoto, M., and Patterson, C.C. (California Inst. of Technol., Pasadena): THE CONCENTRATION OF COMMON LEAD IN SEA WATER. In Geiss, J., and Goldberg, E.D., compilers: Earth Science and Meteoretics, Amsterdam, North-Holland Publishing Co., 1963, pp. 74-89.

Pb was determined in sea waters off southern California, using isotope dilution techniques. Samples were collected in 100-l stainless steel carboys with teflon and polyurethane seals (Pb content of the latter, <5 ppm). Care was taken against contamination during handling. In surface waters, the concentrations of dissolved Pb varied from 0.4-0.08 µg/l, with an average of 0.2 µg/l. In deep waters, the concentrations did not vary much about an average of 0.03 µg/l. Assays of the particulate matter showed that Pb may be about equally distributed among dissolved and particular forms in sea water, so that the total concentrations of Pb may be about twice the values found for dissolved Pb. A diagram of the Pb profiles in sea water illustrates the abrupt decrease in concentrations from surface to deep waters. Pb concentrations in the surface waters increase in going away from the shore.

In discussing the results, the authors conclude, on the basis of their earlier estimates, that the present rate of introduction of Pb to the oceans is 27 times greater than at the time of Pleistocene. The reason for this increase they believe to be the accelerated chemical denudation of soils in agriculture by man, and by the mining of Pb and the converting of it into paints, insecticides, and fuels. The industrial contamination has become important during the last 50 yr. In their calculations, in the last 3 decades, exhausts of Pb from automobiles as burned TEL has increased in the US from zero to $\sim$1.6 x 10^{11} g Pb/yr. Since the conversion of TEL in gasoline to atmospheric aerosols is $\sim$100%; the total amount of Pb introduced to the atmosphere in the northern hemisphere as burned TEL has increased from zero to 3.5 x 10^{11} g/yr. This amount is washed out by rain each year, 2.5 x 10^{11} g/yr falling directly to the oceans and the remainder on land where a portion of it enters the oceans as river runoff. If all industrial sources are counted together, the present annual input of Pb to oceans of the northern hemisphere is 43 x 10^{10} g and the input for the entire earth is about 46 x 10^{10} g/yr.

The input of Pb from all sources is shown in a diagram. Evidence suggests that Pb entering the surface layers of the oceans is quickly ingested by living organisms and a part, estimated to be 2 x 10^{11} g/yr, is transported from surface waters to sediments by means of biological material serving as a carrier. Based on estimation of the rate constant for the biological removal of Pb, a half-life of 7 yr can be calculated for Pb in surface waters. If the values estimated for the removal constant, the preindustrial surface concentration, and the present rate of introduction of Pb are used to predict its present concentration in surface waters, a value is obtained which agrees closely with the observed values. (25 references)

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3387 Bacaner, M. (Univ. Minnesota Med. School, Minneapolis): PHYSIOLOGIC PROCESSES IN ABSORPTION OF POLLUTANTS. Archives of Environmental Health 8:77-84 (Jan.), 1964.

As stated in the introduction, the major factors that determine the body burden of absorbed pollutants involve the chemical nature, size and physical state of the material, the portal entry into the body, the chemical and physical interaction within the body tissues, utilization and damage or interference with normal mechanisms, and the excretion from the body either of the original product or of metabolites. Pollutants may enter by absorption through the skin, inhalation, or ingestion, although skin is not ordinarily an important route in this case. Illustrations of the transport of particles, lung deposition and retention of several substances are included. Reference to Pb states its metabolism to parallel that of Ca. In closing, the author draws attention to the fact that the true estimation of body burden for any individual pollutant requires comprehensive study of multiple parameters.

3388 Baker, R.A., Sr., and Doerr, R.C. (Franklin Inst., Philadelphia, Penn.): CATALYTIC REDUCTION OF NITROGEN OXIDES IN AUTOMOBILE EXHAUST. Journal of the Air Pollution Control Association 14:409-14 (Oct.), 1964.

The authors demonstrate that catalytic reduction of nitrogen oxides from Pb automobile exhaust, using Cu-containing catalysts, is technically feasible. Regular grade Pb gasoline, containing 0.6-2.9 g Pb/gal, was used for the experiments.

3389 Cholak, J. (Univ. Cincinnati, O.): FURTHER INVESTIGATIONS OF ATMOSPHERIC CONCENTRATION OF LEAD. Archives of Environmental Health 8:314-24 (Feb.), 1964.

Some recent investigations concerning the atmospheric concentration of Pb are reviewed. Observations made in 1941 at a number of sites in Cincinnati yielded an average Pb concentration of 5.1 µg/m^3. Analysis of samples from 24 cities in the US during 1954-1955 yielded a mean concentration ranging from 1.47-1.99 µg Pb/m^3, while median values ranged from 1.2-1.42 µg. Cities with a population >2 millions had significantly higher mean and median values; Los Angeles had the highest mean level of concentration. Air over heavily traveled streets contains more Pb than does air over lightly traveled streets and considerably more than ambient air of representative large areas at the community. Average daily and hourly patterns were established. Distinct peaks were observed in the 4-hr period of 7 AM-11 AM; other peaks appeared in relation to increases in motor traffic and domestic and industrial activity. Investigations carried out in Cincinnati from 1941-1962 portray a continual and gradual downward trend in both mean and median concentrations of Pb in air. The mean concentration of 5.1 µg/m^3 in 1941 decreased to 1.43 µg/m^3 in 1962 while the median level fell to 1.27 µg in 1962. After 1954, no concentration >8 µg/m^3 of air was found. It is pointed out that the higher average values and ranges found from 1941-1951 may be partly due to the manner of sampling during this period, and therefore may be somewhat biased, while today continuous monitoring over 24 hr is more representative. The decrease in atmospheric Pb is attributable mainly to a spread of motor traffic in cities over a larger area along with the spread in housing. Also, the mean concentration of particulate matter found in the air in 1961-1962 averages only 0.082 mg/m^3 as compared to 0.37 in 1946-1951. Lead alkyls may be detected in the air in certain areas of gasoline service stations, and occur at times over heavily traveled streets. Most of the findings (in filling stations) were within the range of 0-3.5 µg/m^3 air. The error of analysis is greatest when small volumes of air are sampled because the Pb values are near the limit of detection. Sampling of adequate volumes of air in Cincinnati yielded average amounts of 1.1 µg Pb in the form of Pb alkyls, which approximates 10% of the total Pb. Using still larger volumes of air, the proportion of atmospheric Pb existing as vaporized Pb alkyl was found to be 1.3% of the total Pb in air.

3390 Cominelli, A. (Provincial Med. Officer, Italy): Autoveicoli e inquinamento atmosferico. (MOTOR VEHICLES AS A SOURCE OF AIR POLLUTION.) Annali della Sanita Pubblica 25, No. 5:955-1006, 1964.

After reviewing minor emissions such as evaporation of gasoline and blow-by gases, the products resulting from automotive internal combustion are considered. This heterogeneous mixture of gases varies in composition with the type of engine used, gasoline or Diesel, and also with the conditions under which the engine is operated. Toxic emissions described in detail include carbon monoxide, hydrocarbons, nitrogen oxides, aldehydes, sulfur anhydride and Pb, the latter from the addition of the antiknock agents TEL or TML in amounts ranging from 0.4-0.6 ml/l of gasoline. Concerning the contribution of Pb to air pollution, the author cites some concentrations reported in the literature, such as a range of 3.6-14 µg Pb/m^3 for Los Angeles (Rose, 1962), and 2.42-5.10 µg/m^3 for Milan (D'Ambrosio et al, 1958); Petrilli and Kanitz (1962) found 8.83 µg/m^3 in gasoline service stations and up to 60 µg close to a motor vehicle within the city. He comments that atmospheric Pb concentrations found by various authors are difficult to compare because of the different sampling and analytical methods used. He then refers to experiments that have shown that prolonged daily ingestion of 1-2 mg Pb results in a notable increase of Pb in the blood and of urinary and fecal Pb excretion, without, however, causing clinical signs. According to Kehoe, an individual who absorbs ∿0.03 mg Pb daily through the intestine (which is 1/10 of the total amount ingested) and ∿0.02 mg from the air, will tolerate, with a sufficient margin of safety, another daily dose of 0.03 mg, which implies that the daily amount of Pb absorbed from the air could be safely doubled as long as the ingested amount remains the same. Although investigations made in 1947-1960 by the Swiss Federal Committee on Gasoline Additives are also generally optimistic, further studies concerning prolonged exposure to minimal doses of Pb should not be neglected. In general, the author recommends the adoption of exhaust control devices for motor vehicles.

He finally comments on regulations recently adopted in the State of California and in France, by saying that the California regulations appear to be stricter, prescribing fixed standards of pollutants, but to date they do not seem to be enforced. The French ones are broader, in conformity with the general European trend in the matter, aiming to a mere control of discharges. (30 references)

3391 Crozaz, G., Picciotto, E., and De Breuck, W. (Univ. Libre, Brussels, Belgium): ANTARCTIC SNOW CHRONOLOGY WITH Pb^{210}. Journal of Geophysical Research 69:2597-2604 (June 15), 1964.

The mean ^{210}Pb concentration in Antarctic air at ground level at the Base Roi Baudouin for the year 1958 was found to be 1.3 x 10^{-3} decay/min/kg air. In samples of surface snow accumulated for 2-5 yr, the average ^{210}Pb activity was of the order of 100 decay/hr/kg of snow. This activity seemed to be independent of the local rate of accumulation. The variations of ^{210}Pb activity as a function of depth, studied on two vertical firn profiles spanning an interval of >200 yr at two bases showed the ^{210}Pb activity to decrease exponentially with depth. The most plausible interpretation is that the rate of water accumulation and the initial ^{210}Pb concentration in the snow have remained constant at both places over the last 100 yr.

3392 Editorial (Cohen, G.): Le sort du plomb tetraéthyle. (THE FATE OF TETRAETHYLLEAD.) Nature (Paris) No. 3350:230, 1964.

Three American oceanographers and geologists have studied the fate of TEL in nature after its use as automotive antiknock agent. Since Pb is not combustible, Pb particles escape into the atmosphere from where they are washed out by rain and carried into the water of rivers and eventually to the oceans. In the Pacific and Atlantic ocean and in the Mediterranean, considerable Pb deposits have been found at depths of <900 m, while at lower depths the Pb concentration rapidly decreases. The American investigators estimate that extraction of Pb from plumbiferous rocks may contribute to these deposits at most 10,000 tons/yr, that the rivers carry ∿200,000 tons of Pb compounds, and rain dumps ∿275,000 tons directly into the oceans. These figures will soon be ascertained by a comparative study of the Pb content of snow in the mountains of California and fossil snow from mountains in Greenland.

According to H.V. Warren (1963), vegetables growing near highways in the US contain 50 times as much Pb as is permissible for human consumption. In Derbyshire in England, a disease called "Derby stomach" exists which is characterized by colics and which is caused by prolonged ingestion of Pb. There is also a "Derby goiter" due to Fe deficiency in the soil. Phenomena of this kind have induced Warren to some general considerations. He maintains that man originally settled in the alluvial plains such as the valleys of the Nile and Yangtse, where the soil was propitious for human life. With the arrival of culture, soil deficiencies and excesses have developed. It is perhaps still too early to draw conclusions concerning health with respect to human geography. It could be possible that the disturbance of a dietetic balance between Cu, Zn, Hg, As, Se, V, etc, has an influence on the etiology of diseases like cancer and cardiac afflictions. Pb could be responsible for multiple sclerosis, that is, progressive degeneration of the nervous system, thus leading to serious damage or premature death. Statistics seem to indicate that multiple sclerosis is relatively frequent in regions where the soil is rich in Pb compared to areas where the Pb content is average or below average.

3393 El'terman, V.M.: IMPROVING THE ECONOMY OF FILTERS FOR REMOVING HARMFUL GASES IN EJECTED VENTILATION AIR. Nauchn. Raboty Inst. Okhrany Truda Vses. Tsentr. Sov. Prof. Soyuzov 1964, No. 6:3-9.

Air ejected during the production of highly toxic substances such as tetraethyllead, chlorcyan and prussic acid, was purified by means of a recirculation apparatus which reduced the total amount of harmful substances by a factor of 10-12 and the cost of filters by a factor of 4-5. (From Referativnyi Zhurnal, Khimiya 1966, No. 3, Pt. II:Abstract No. 3I451; Chemical Abstracts 65:Abstr. No. 4522, 1966)

3394 Engler, H. von (Offenbach, West Germany): Reinigung der Abgase bei der Aufarbeitung von Accuschrott. (THE PURIFICATION OF THE FLUE GAS OF LEAD RECLAMATION PLANTS.) Batterien 18:606-8 (May), 1964.

A Venturi purification system for storage battery factories, which is economical in investment and maintenance costs, is described. A battery scrap refining plant using this system may be installed near residential areas since the flue gas leaving the stack is similar in composition to the gases leaving the chimneys of residences.

3395 Gold, S., Barkhau, H.W., Shleien, B., and Kahn, B. (Robert A. Taft Sanit. Eng. Center, U.S. Public Health Service, Cincinnati, O.): MEASUREMENT OF NATURALLY OCCURRING RADIONUCLIDES IN AIR. In Adams, J.A.S. and Lowder, W.M., ed.: The Natural Radiation Environment. Chicago, Univ. of Chicago Press, 1964, pp. 369-82.

Measurements of naturally occurring radioactivity associated with air particulates in Cincinnati, Ohio, are reported. Measurements were made daily for extended periods and, at the same time, meteorological variables such as wind speed and precipitation were observed so that their influence on radionuclide levels could be evaluated. Samples were taken at a height above the ground at which air would be inhaled. ^{222}Rn and ^{220}Rn daughters were collected by drawing air through a membrane filter from which their activity was counted. Seasonal and daily variations were studied. A gross annual ^{222}Rn value of 260 pCi/m^3 was estimated for Cincinnati from the average 8 AM and 3 PM concentrations. ^{210}Pb and beryllium (^{7}Be), together with fission products from fallout, were measured in particulates collected on glass-fiber filters during April and May, 1961. ^{210}Pb was separated chemically from the filter and its collected air particulates; the basic solution containing the Pb was acidified, precipitated as Pb sulfide and metathesized to the sulfate by heating with sulfuric acid in the presence of Bi holdback carrier. Activity of the ^{210}Pb parent was computed from the ^{210}Bi count rate, measured on a low-background β counter. Highest and lowest values found for ^{210}Pb were 0.015 and 0.0030 pCi/m^3, respectively, with a daily weighted average of 0.0082.

3396 Goldsmith, J.R. (California State Dept. Public Health, Berkeley): THE BODY BURDEN AND AIR QUALITY STANDARDS. Archives of Environmental Health 8:39-43 (Jan.), 1964.

The value of the concept of the body burden in setting air quality standards is discussed. Body burden of a pollutant is defined as such level of the substance in organs or fluids of the body as either produces or is capable of producing damage or significant interference of the body or of the respective organ or tissue. Estimation of the body burden in relationship to exposure depends on the development of sensitive and valid methods for measuring the levels of substances in biological materials, choice of populations of persons, and their availability for study, and the manner in which the biologic system is sampled. A formula found useful for exposure to carbon monoxide, for which the body burden concept has been used for setting the air quality standard, is shown. However, dynamic models should be developed and more widely used for greatest use of body burden estimates.

Work is under way to set air quality standards for Pb. From field studies so far undertaken, an estimate of the body burden of Pb has been obtained from the collection of blood samples. These indicate a substantial difference between urban and rural residents, somewhat higher values in males than in females and a tendency of slightly greater values in smokers than in nonsmokers. The latter difference is thought to be due to Pb arsenate sprays which were formerly used in tobacco cultivation.

It is concluded that the body burden is valuable because of its relevance to exposures not only to elementary, but also to complex substances, and to the association of several trace metals.

3397 Goldsmith, J.R. (Dept. Public Health, Berkeley, Cal.): USES OF MEDICAL AND EPIDEMIOLOGICAL RESEARCH IN THE CONTROL AND PREVENTION OF AIR POLLUTION. Proceedings of the Royal Society of Medicine 57, No. 10, Part 2:1034-40, 1964.

Pb is not mentioned in the discussion, the conclusions of which include the statement that in California, air quality standards for "oxidant" and for CO have been used as a basis for control of motor vehicle emissions. Pb is shown in the appendix which is a table of California Standards of Ambient Air Quality (amended by State Board of Public Health, 1962, incorporated into the California Administrative Code, Title 17, Chapter 5, Subchapter 5, Article 1). There it is noted "not applicable" in "adverse" level of pollutants, with a footnote to the effect that Pb levels should be set on the basis of average values for long periods. While data are abundant concerning human response to 8-hr/day 5 days/wk exposures, data are insufficient for the effects of continuous exposure in community air pollution. While laboratory studies will be pursued with vigor, it becomes very important that local agencies collect data on existing Pb levels. Since Pb exposures are from multiple sources, community air pollution standards should be based on a portion of the total limit for population exposure.

3398 Hammond, P.B., and Aronson, A.L. (Univ. Minnesota, St. Paul): LEAD POISONING IN CATTLE AND HORSES IN THE VICINITY OF A SMELTER. Annals of the New York Academy of Sciences 111, Art. 2:595-611 (Apr. 24), 1964.

An outbreak of Pb poisoning in 1962 in horses and cattle from 3 different farms in the vicinity of a Pb smelter near St. Paul, Minn., where old battery plates were melted down, is reported. After 4 cows had died at Farm A, the veterinarian serving the area requested assistance. Pb poisoning was confirmed on the basis of characteristic clinical signs exhibited by one of the surviving cows and the presence of ~18 ppm Pb in the liver of a dead cow. In total, 9 cows, 2 horses and 6 ponies died and 3 additional horses showed signs of illness while 4 cows from Farm C never exhibited signs of poisoning. The Pb concentration in the blood of 12 cows which had survived the episode, ranged from 0.30-1.26 mg/l, compared to an average normal of 0.10-0.129. The range of Pb concentrations in the blood of 6 horses tested in the vicinity of the smelter was 0.23-0.47 mg/l compared to a normal of 0.04. The Pb content of alfalfa-clover hay and corn silage grown immediately across the road from the smelter and fed to the animals, was 26-284 ppm (analyzed without further drying). In order to get a better picture of the extent of contamination, samples of wintered-over vegetation were analyzed. Contamination with Pb decreased with the distance from the smelter and was appreciably greater when the samples were taken close to busy highways. It was estimated that the minimum cumulative fatal dose of Pb for cows was 6-7 mg/kg/day while horses appeared to be more susceptible, calculating that they had ingested 2.4 mg Pb/kg/day. Even under conditions of prolonged intake the syndrome in cattle was acute or peracute. Analysis of the Pb content of the milk from 8 normal cows (0.006-0.013 ppm) and from the affected showed a rather constant relationship between Pb excretion in milk and Pb concentration in the blood cells, the ratio of Pb in blood to Pb in milk being ~23. The high level of Pb in the colostrum of a Pb-exposed cow about to freshen suggested that the blood-milk barrier acquires different permeability characteristics for metals at the time of parturition. Also, Pb excretion in milk was not enhanced during therapy with EDTA. The conclusion was drawn that the mammary gland and the kidney apparently behave differently with regard to excretion of the Pb EDTA complex.

Evidence was presented that excessive mobilization of Pb by means of EDTA, at least under conditions of long-term accumulation in cattle, is a hazardous procedure. The authors point out that although this observation was made only on 1 animal, it is of sufficient importance to warrant study. No adverse reactions were seen in chronically poisoned horses, given 110 mg EDTA/kg iv on 3 successive days. There was no effect whatever on the Pb concentration in blood, leading to speculation on the mobility of Pb deposited in the erythrocytes and in soft tissue generally under conditions of chronic intake as compared to the acute.

Since public reaction to the Pb poisonings on the farms was vigorous, the state health department was requested to analyze well water, home-grown vegetables, and milk, and to test blood and urine of residents. In no cases was any evidence of abnormal Pb accumulation found. The problem was clearly one of hazard to herbivorous animals in the vicinity of the plant.

3399 Hettche, H.O. (Univ. Hamburg, West Germany): Benzpyrene und Spurenelemente in Grosstadtluft. (BENZOPYRENES AND TRACE ELEMENTS IN THE ATMOSPHERE OF CITIES.) International Journal of Air and Water Pollution 8:185-91 (Mar.-Apr.), 1964.

The study was undertaken for the purpose of correlating atmospheric pollution and mortality from cancer in German cities. Dust from city streets in Hamburg was collected over 19 mo and the weight of dust, ash, benzopyrenes and trace elements was determined. The dust content of 19 samples taken between September, 1961 and April, 1963, ranged from 0.16-0.36 (av 0.233) mg/m^3; for the year 1962 alone, the mean concentration was 0.217 mg/m^3. The proportion of the dust which was soluble in methanol was 45% or 0.106 mg/m^3. On the average, 1000 m^3 air contained 100 μg 3,4- and 76 μg 1,2-benzopyrenes. However, there were great differences in 3,4-benzopyrene levels between summer and winter. A maximum of 388 μg/m^3 was reached in January, 1963, compared with only 17 μg in the previous spring and summer, although the motor vehicle traffic had not increased. The average concentration of trace elements during 1962 was found as follows, in mg/1000 m^3: Pb, 2; Zn and Cu, 1 each; Ti, 0.5; Mn, 0.2; V, Ni, Cr, Sb and Co, 0.1-0.01; Mo and Be, <0.01. The high Pb content was attributed to the fact that the sample was taken close to a traffic light. Seasonal and local differences in the concentration of the trace elements are pointed out and compared with findings by other authors. The relationship of cancer of the lung and other organs, and of respiratory diseases to atmospheric contaminants, as reported for the US and other countries, is discussed.

3400 Hettche, O. (Kongressbund Deutscher Medizinalbeamten, Baden-Baden, West Germany): Gesundheitsgefährdung durch Kraftfahrzeugabgase. (HEALTH HAZARDS BY AUTOMOTIVE EXHAUST GASES.) Öffentlicher Gesundheits-Dienst 26:430-8, 1964.

The author states that the atmospheric pollution by CO, Pb and N oxides is still below the tolerated level. Aldehydes are obvious because of their odor and ozone and oxidants occur solely in subtropical areas. (From Deutsche Zeitschrift für die Gesamte Gerichtliche Medizin 56, No. 5:436, 1965)

3401 Hill, C.R. (Royal Cancer Hosp., Surrey, England): ^{210}Po: A NATURALLY OCCURRING COMPONENT OF FALLOUT. ORAU, 4th Symposium on Radioactivity in Scandinavia, Riso, Denmark, Oct. 5-6, 1964, 15 pp.

The natural occurrence and behavior in the biosphere of isotopes of Po, in particular of ^{210}Po which arises, in association with lead ^{210}Pb as a decay product of atmospheric Ra, was discussed. ^{210}Po body burdens probably arise as a result of ingestion and inhalation of ^{210}Po itself and of certain of its precursors such as ^{210}Pb. Results of ^{210}Po measurements in the environment and in human foods and tissues in temperate and arctic latitudes are given. Mean dose rates found in bone of arctic residents have been as high as 600 mrem/yr, and the corresponding genetic dose rate is estimated to be of the order of 100 mrem/yr. (From Nuclear Science Abstracts 21: Abstr. No. 6468, 1967)

3402 Hirschler, D.A., and Gilbert, L.F. (Ethyl Corp., Detroit, Mich.): NATURE OF LEAD IN AUTOMOBILE EXHAUST GAS. Archives of Environmental Health 8:297-313 (Feb.), 1964.

The present studies, which are a continuation of work published by the author and coworkers in 1957 (Industrial Engineering and Chemistry 49:1131-42), deal with the inorganic particulate compounds of Pb which result when gasoline containing TEL is burned in internal combustion engines, with the relationship of the amount of Pb exhausted by cars to that burned in the fuel, the particle size distribution and the composition of the solids. In some experiments the amount of organic Pb present was measured. A large electrostatic precipitator was used for the collection of the entire exhaust gas output of a car while it was being operated on a test cycle representative of city-suburban driving. All parts of the collection system were coated with a thin layer of polyvinylacetate. After each test, these parts were washed in a solution of trichloroethylene containing 5% toluene and a dispersant, dissolving the coating and releasing particles into the solution. This method is applicable only to the study of inorganic Pb compounds. The results show that only part of the Pb which is contained in the gasoline burned by cars is discharged in the exhaust gas, most of it being in the form of inorganic particulate solids of Pb halide (Cl·Br) or complexes of ammonium and Pb halides, and extremely low amounts of organic Pb (~0.023% of TEL burned was found as organic Pb while 1.7% of the fuel was exhausted unburned). One-fourth or more of the Pb burned is retained in exhaust system deposits or discarded during changes of lubricating oil and oil filters. The percentage of Pb burned by the car which is discharged in the exhaust gas depends on the driving conditions and prior driving history of the car. In a city-type driving test, at moderate speeds, 3 cars exhausted from 28-45% of the Pb burned in the fuel, based on average values from many tests. When exhaust systems were fairly free of deposits, the Pb emission was in the 20-25% range; after the cars had been operated for several thousands of miles, Pb emission increased into the 35-55% range. Individual tests showed wide variations which indicate that a random factor, probably deposit flaking in the exhaust system, is involved in the process of exhausting Pb. Operation at high speeds, and particularly full-throttle acceleration at high speeds, discharged several times as much Pb as was being burned. However, continued operation of this type causes Pb emissions to decrease, probably because exhaust system deposits were gradually partially expelled. This treatment returns the exhaust system to a condition where it again accumulates Pb deposits and exhausts less Pb in subsequent driving at moderate speeds.

Particulate Pb compounds in exhaust gas ranged in particle size form 0.01 µ to several mm in diameter. From 1/2-2/3 of the Pb exhausted in city driving had a particle size ≤5 µ and 1/4-1/3, >5 µ. From 4-12% of the exhausted Pb had a particle size ≤1 µ. Of the total Pb collected, 99.7% was removed from the gas by the 1st filter in the sampling train; of the balance passed by this filter, ~2/3 was inorganic and 1/3 organic.

3403 Hochheiser, S., Nolan, M., and Dunsmore, H.J. (Robt. A. Taft Sanit. Eng. Center, Cincinnati, O.): AIR POLLUTION MEASUREMENTS IN DUQUESNE, PENNSYLVANIA. SEPTEMBER-OCTOBER, 1963. U.S. Public Health Service Publication, Oct., 1964, 36 pp.

A cooperative, 1-mo study of ambient air quality was conducted in Duquesne, Pennsylvania, from September 23 to October 30, 1963, to define the existing and potential community air pollution problems. Samples were collected continuously with automatic sampling equipment, and 30-min, short-term samples were collected periodically, using manual sampling techniques. Total atmospheric particulate pollutants were estimated, and, additionally, particulate samples were analyzed spectrographically for content of metals (a total of 15, including Pb). Other pollutants determined were the various oxides, oxidants and aldehydes. Particulate concentrations during the study ranged from 99-963 µg/m3.

In correlating the percent composition of the metals and total atmospheric particulate concentrations, that of Sb, Cd, and Mn tended to increase with increasing particulate concentration while that of the other metals did not generally so increase significantly. The percentages of Pb for the various ranges of particulate concentrations varied from 0.1-0.6. The atmospheric concentrations of the metals were also compared to the national urban average. The metals content in Duquesne was higher than this average, particularly for Mn, Fe, and Cr. That of Pb was 1.7 µg vs the national average of 0.5 µg/m^3.

3404 Horiuchi, K. (Osaka City Univ. Med. School, Osaka, Japan): A STUDY ON THE STATUS QUO OF AIR POLLUTION IN JAPAN. Osaka City Medical Journal 10, No. 1:181-200, 1964.

The history of Japanese industry and the problem of public health as a matter of governmental concern are described and illustrated in maps and charts. Lack of legislation in regard to exposure standards, environmental standards, and MAC's brought proposals from the Japanese Public Health Association. Discharge Standards laid down in the Smoke Control Law (1963) established an allowable concentration of 0.5-2.0 g/N m^3 for soot and dust. The regulations controlling public nuisance from enterprises in Osaka Prefecture (1954) set the upper limit for harmful substances. The limit for Pb discharge was set at 0.15 mg/m^3. No laws have yet been established for emergency measures. Various methods for measuring and analyzing atmospheric pollutants are described. (14 references)

3405 Imano, K.: AIR FILTER. Japan Air Cleaning Association (Tokyo) 1, No. 1:41-8, 1964.

Air pollutants were discussed and the chemical composition of automobile exhaust was given. The following MAC from industrial emission sources were stated: ppm, As 1, Cl 1, perchloric acid 10, cyanic acid 20, nitric acid 40, P compounds 2, C disulfide 20, Cr compounds 0.5, sulfuric acid 5, Hg 0.1, Pb 0.5 mg/m^3. Three methods for the elimination of pollutants were discussed: the absorption technique, the adsorption technique and the incineration technique. (From APCA Abstracts 13, No. 3:Abstr. No. 8457, 1967)

3406 Karol, I.L.: PLANETARY DISTRIBUTION OF ^{210}Pb IN THE FREE ATMOSPHERE AND ITS USE IN ESTIMATING VERTICAL EXCHANGE PARAMETERS AND WASHOUT OF AEROSOLS BY CLOUDS AND PRECIPITATION, AS WELL AS THE RATE OF EXCHANGE BETWEEN THE TROPOSPHERE AND STRATOSPHERE IN THE NORTHERN AND SOUTHERN HEMISPHERES. In Radioaktivnye Izotopy v Atmosfere i Ikh Ispol'zovanie v Meteorologii. Moscow, Atomizdat, 1964, pp. 132-52.

A theoretical 3-layer model of the atmosphere is used to determine the vertical profile of Pb in the extratropical latitudes of the Northern Hemisphere and to estimate the exchange rate between these layers and the washout of aerosols by clouds and precipitation. The annual balance of ^{210}Pb in the stratosphere of both the northern and southern latitudes was calculated. (From Nuclear Science Abstracts 20:Abstr. No. 16641, 1966)

3407 Kehoe, R.A. (Univ. Cincinnati, O.): STANDARDS WITH RESPECT TO ATMOSPHERIC LEAD. Archives of Environmental Health 8:348-54 (Feb.), 1964.

The prospect for the establishment of a standard for the satisfactory quality of the ambient air in respect to Pb is discussed on the basis of threshold limits established for workmen and on the basis of observations in the laboratory over more than 20 yr. A hygienic standard of the quantity of Pb in air to which workmen may be exposed with reasonable safety has long existed and the value set has been subject to much re-examination and just recent revision. Despite any technical refinements in revisions of the standard, it is still a rough specification through the fulfillment of which a serious industrial hazard is reduced by purely technical means to reasonably acceptable dimensions. While, despite its shortcomings, it has proved applicable as good operating practice in the Pb industries, it is not adequate for it fails to portray fully the occupational exposure of workmen to Pb.

There is no evidence at present that the Pb concentration in the general atmosphere in the US is a source of hazard to any person or segment of population in this country. While there are cases of Pb poisoning in industry and in the general population, their sources differ widely in type and magnitude from those causing contamination of the ambient air, food and beverages of entire communities. Although lack of evidence that the concentrations in air are hazardous is not, in itself, convincing, there already is the required evidence as to conditions, quantitative and reproducible, that cause Pb poisoning, and as to the order of magnitude of the present margin of public safety. Extensive experience in industry and laboratory experiments have shown that Pb poisoning occurs in man only when certain well-defined conditions are fulfilled. These rest on a range of concentration in blood (and a corresponding but less defined range in urine) which denotes an unusual (or abnormal) absorption rate and extent as compared to that common to the "normal" person or population group. Up to a certain point in concentration, no known or presently demonstrable symptom or sign of Pb intoxication may be expected to occur even in the least tolerant (or most susceptible) person of any age.

Therefore, there is now an empirical standard whereby the present population in the US or an individual member of it can be identified as "normal" in terms of the range of the concentration of Pb in the blood (and urine), which has been found to be characteristic over a period of >20 yr of observations in the Kettering Laboratory. A standard which defines the limit of human safety with respect to the absorption of Pb also exists.

It is highly dubious that a standard for the Pb content of ambient air would be adequate or even relevant in the maintenance of public safety, so long as the amount of Pb absorbed by the average citizen from food and beverages is larger than that absorbed from the air. The control of atmospheric Pb, therefore, cannot obviate a potential hazard of Pb intoxication to the general population. In order to justify and enforce an air quality standard for Pb, there must be a reasonable certainty that the alimentary absorption of Pb has been stabilized. Since Pb excretion in the feces represents 90-95% of the ingested Pb, a faithful portraval can be had of the daily intake of Pb in food and beverages.

The standard of safety as to the Pb content of air in industry, while crude, is reasonably valid, for in occupational exposure, the Pb increment associated with inhalation of Pb can become sufficiently large to reduce the significance of the dietary Pb. However, the variable of intermittency has to be considered since occupational exposure occurs only for 8 hr daily, 5 days/wk while exposure to ambient air is continuous, although somewhat variable in intensity. Precise observations in the laboratory are required to validate the establishment of a concentration to which populations may be exposed safely. Experiments are under way to study the pattern of the metabolism of Pb upon varying duration of exposure to a constant level of atmospheric Pb. After following the daily intake and output of Pb of 2 healthy subjects for ~1 yr, the subjects were exposed in 2 parallel respiratory chambers to air containing 0.15 mg Pb (as sesquioxide)/m^3, in particles of 0.05 μ in diameter; for 4 mo they spent 3 hr daily there and for corresponding and successive periods of time 6, 9 and 12 hr, respectively. Six more months of observation with no further exposure, will permit determination of the mathematical relationships involved in varying degrees of intermittency of an otherwise constant type and degree of exposure.

A question that still needs investigation is what least change in concentration of Pb in ambient air is capable of inducing a demonstrable change in the output of Pb from the body. This threshold has been established experimentally as to ingestion of Pb, thus providing a basis for a standard of safety with respect to dietary Pb. Such a threshold for respiratory absorption, considered together with the factor of time, will designate a level of Pb concentration in the air to which healthy persons can be exposed over a lifetime without accumulating a potentially dangerous body burden of Pb.

3408 Kloke, A., and Riebartsch, K. (Federal Biol. Inst. of Agriculture and Forestry, Berlin-Dahlem, Germany): Verunreinigung von Kulturpflanzen mit Blei aus Kraftfahrzeugabgasen. (THE CONTAMINATION OF PLANTS WITH LEAD FROM MOTOR EXHAUSTS.) Naturwissenschaften 51, No. 15:367-8, 1964.

In introducing their discussion, the authors consider that the constantly increasing contamination of the atmosphere and vegetation by Pb is almost exclusively caused by automotive exhausts. According to a German regulation, automotive fuels must not contain >0.06 vol% of TEL, and a content of not >0.05 vol% is recommended. The contamination of grass with Pb in concentrations up to 300 μg/g of dry substance along traffic-bearing roads in the USA, as reported by Cannon and Bowles (1962), is cited and remarked upon that cattle ingesting such grass would not only exhibit Pb poisoning but that considerable Pb would appear in the milk, rendering rearing of offspring impossible in some cases.

In the summer of 1963 the authors investigated the relationship of traffic density to the Pb content of plants and soil at different locations in West Berlin. They found Pb in μg/g of dry substance (with percent that can be washed off given in parentheses): in garden in Frohnau and Botanical Garden, both remote from traffic: in grass, 6.0 (<5) and 8.5 (>10), respectively; in roots, 43.0 and 46.5; in soil, 18.5 and 66.0. At 300 m from main road the corresponding values were: 15.3 (10); 56.2; 29.3. On divider strip in a road bearing 11,000 autos in 12 hr: 16.2 (30), 38.8, and 6.4; the same in a road bearing 23,000 cars in 12 hr: 47.9 (20) 38.0, and 12.3; traffic island of square bearing 32,000 autos in 12 hr: 57.0 (30), 65.2, and 36.5, respectively in grass, roots and soil. The high percentage of Pb which can be washed off the grass points to a high adsorption at the surface of the leaf so that total absorption and transport in the plant would scarcely occur. The Pb contained in the roots is thought to have been taken up from the soil. According to the authors' findings adsorption of Pb by the root increases with the Pb content of the soil but the root transports only small amounts of Pb to the surface parts of the plant. The high Pb content of soil in the Botanical Garden is thought to be due to frequent fertilization with leaves gathered in the streets.

3409 Kochnev, M.I., Olesova, A.I., and Dushin, I.N.: (TREATMENT OF DUST FROM EXPERIMENTAL SMELTING IN AN OXYGEN JET.) Tsvetn. Metal. 37, No. 5:88-90, 1964.

Flue dust containing Cu 9.7, Zn 14.4, Pb 51, Cd 0.08, Se 0.008, Te 0.012, Tl 0.0016, and In 0.003% was granulated with coke and roasted in a pilot horizontal tubular furnace for 1 hr at 1150-1200°. Extraction into fume was Zn 97, Pb 74, Se >88, Cd 100, Te ≤100, and Tl 82%. The fume product contained Zn 75.4, Pb 8.4, Se 0.009, Cd 1.6, Te 0.11, In 0.009, and Tl 0.005%. (From Chemical Abstracts 61:11664, 1964)

3410 Kotin, P., and Falk, H.L. (Natl. Cancer Inst., Bethesda, Md.): ATMOSPHERE POLLUTANTS. Annual Review of Medicine 15:233-54, 1964.

A review with 109 literature references on atmospheric pollutants is presented. On page 246 of the paper, the importance of Pb as a pollutant is briefly discussed. The toxicity of Pb has been proved in studies on occupational exposure. Emissions from motor exhausts are the almost exclusive sources of Pb found in polluted air as most gasolines contain up to 3 ml Pb/gal. According to Cholak and coworkers (1950, 1952), acute Pb toxicity with characteristic signs of chronic Pb poisoning have not been observed as a result of exposure to Pb concentrations in air. However, in view of the presence of Pb in the general environment (in food, beverages and household products), the author believes that the potential hazards of Pb in relation to the total body burden needs to be assessed, by citing, in part the work by Hofreuter et al (1961) who analyzed Pb levels in blood and urine of urban and rural populations and who confirmed earlier studies on the body burden of Pb in relation to residence.

3411 Kreichelt, T.E., and Dahle, E.W., Jr. (Robt. A. Taft Sanit. Eng. Center, Cincinnati, O.): AIR POLLUTION MEASUREMENTS IN BALTIMORE, MD. MARCH AND APRIL 1964. U.S. Public Health Service Publication, November, 1964, 55 pp.

A 5-wk pilot study of ambient air quality was conducted in Baltimore, Maryland, in March and April, 1964. Typical atmospheric particulate pollution in Baltimore and several other American cities of similar size as measured by the National Air Sampling Network were tabulated. Total suspended particulates and Pb composition, both in $\mu g/m^3$, were as follows: Baltimore, Md., 144, 0.7; San Francisco, Calif., 76, -; Washington, D.C., 119, -; St. Louis, Mo., 176, 0.4; Cleveland, O., 168, 0.6; Houston, Tex., 117, 0.5; Milwaukee, Wis., 151, 0.5; national av, 136, -. The other components analyzed were S and N dioxides, CO, nitric oxide, aldehydes and total hydrocarbons.

3412 Larsen, R.I. (Robt. A. Taft Sanit. Eng. Center, Cincinnati, O.): UNITED STATES AIR QUALITY. Archives of Environmental Health 8:325-33 (Feb.), 1964.

A National Air Sampling Network was established by the Public Health Service to measure US air quality. Concentrations of total suspended matter and 19 metallic (including Pb) and other pollutants, as determined in 24-hr collections every 2 wk on a random schedule in the central business districts of cities in the US, are tabulated according to several parameters depicting air quality (these include the arithmetic and geometric means, standard geometric deviations and concentrations exceeded by the highest 1% of samples and their mean ratio). The following 6 cities recorded highest concentrations for 2 metallic pollutants, as indicated: Baltimore, Sb, and Cr; Birmingham, Sn and Zn; Boston, Ni and V; Cleveland, Mn and Ti; Los Angeles, Cu and Pb; Tacoma, Bi and Cd. Maximum pollutant concentrations are also compared with the threshold limits established by the American Conference of Governmental Industrial Hygienists. Gaseous pollutant parameters as found in a Continuous Air Monitoring Program are also given for SO_2 concentrations measured in 8 cities and for CO and N oxides for some cities. Gaseous pollutant concentrations on the worst 1% of days were less than the ACGIH levels but greater than those established in the USSR. Pollutant concentration was found to be related to size of city and distance from its center. The sulfate particulate concentration was related to SO_2 concentration.

In discussing means for improving US air quality, combustion processes, including coal combustion and motor exhausts, are held to be the major sources of pollutants. Means are presently available or are being developed to control the emission of all these pollutants except the N oxides, which come from all combustion sources. There is no known easy method for controlling N oxides. In the decades ahead, the ultimate solution to pollution from the N oxides as well as the other pollutants may be the use of much less high temperature combustion, in homes, vehicles, and industry. Fuel cells and atomic fission or fusion might then power the nation electrically.

3413 Lockhart, L.B., Jr. (US Naval Research Lab., Washington, D.C.): RADIOACTIVITY OF THE RADON-222 AND RADON-220 SERIES IN THE AIR AT GROUND LEVEL. In Adams, J.A.S. and Lowder, W.M., ed.: The Natural Radiation Environment. Chicago, Univ. of Chicago Press, 1964, pp. 331-44.

Extensive measurements of atmospheric radioactivity have been made at various sites by using air monitor equipment of the US Naval Research Laboratory, primarily designed for the detection of nuclear explosions. The technique used involved the estimation of the contribution of ^{214}Pb plus ^{214}Bi, ^{212}Pb plus ^{212}Bi and gross fission products to the total β activity collected on air filters through measurement of the rate of decay during a 16-hr period. The procedure permits the determination of the contribution of ^{222}Rn daughters (^{214}Pb plus ^{214}Bi) and ^{220}Rn daughters (^{212}Pb plus ^{212}Bi) to the initial radioactivity. The measured concentrations of ^{222}Rn and its daughters were representative of the minimum in the diurnal variation of this activity, and those measured of ^{212}Pb, because of its longer effective life-time on the filter, were more characteristic of the daily averages of this isotope in the air. Measurements of natural radioactivity in ground-level air made during 1950-1962 in Wales and Kodiak, Alaska, Washington, D.C., Yokosuka, Japan, Lima, Peru, Chacaltaya, Bolivia, Rio de Janeiro, Brazil, Little America V, Antarctica and at the South Pole ranged from 0.47-122 pCi/m^3 for ^{214}Pb and from <0.01-2.54 ^{212}Pb. The data show that sites located in the path of maritime air have generally lower natural atmospheric radioactivity than those whose environmental air has had an overland route. Diagrams are included of monthly and seasonal variations and explanations of these findings with respect to geographical location are attempted.

In conclusion it is stated that the radioactivity of the air is the result of the interaction of many factors, including time of day, season, and weather.

3414 Nozaki, S.: SELECTION OF AIR FILTER. Japan Air Cleaning Association (Tokyo) 2, No. 2:20-9, 1964.

The selection of air filters for dusts was discussed. Types of dust collectors available and the sizes of particles collected were tabulated. Tabulations were made of collection of dust and mists of such substances as Cd, P, Pb, o-dinitrocresol, Ba, pentachloronaphthalene, H_2SO_4, Mn, etc. (From APCA Abstracts 13:Abstr. No. 8682, 1967)

3415 Patterson, R.L., Jr., and Lockhart, L.B., Jr. (US Naval Research Lab., Washington, D.C.): GEORGRAPHICAL DISTRIBUTION OF LEAD-210 (RaD) IN THE GROUND-LEVEL AIR. In Adams, J.A.S., and Lowder, W.M., ed.: The Natural Radiation Environment. Chicago, Univ. Chicago Press, 1964, pp. 383-92.

^{210}Pb, which has a 22-yr half-life, is formed in the atmosphere by the normal process of decay of ^{222}Rn. The removal process for ^{210}Pb is rainout, with small quantities removed by dry deposition or fallout.

In the study reported, some of the observed concentrations of ^{210}Pb in the air were considered as a function of time and space, and an attempt was made to correlate these results with the concentrations of ^{222}Rn observed concurrently at the same sites. The sampling sites were located primarily along the 80th meridian (west) except for the Mauna Loa, Hawaii station which is at a high altitude in the Southern Hemisphere. ^{210}Pb concentrations in the air at ground level were determined monthly or bimonthly from September 1960 through 1962, by radiochemical analysis, and the data obtained in units of 10^{-15} Ci/m^3 air were tabulated and presented in bar graphs as a function of time and latitude. At the subtropical and tropical sites (Miami to Antofagasta), definite changes according to periods were found which occurred at roughly comparable times of the year regardless of latitude or season, both at high-altitude and sea-level sites. Month-to-month changes at the other stations in the Northern Hemisphere were often large and erratic, with no discernible seasonal pattern. A decreasing concentration of activity was obvious in the more southerly regions, due to the lack of appreciable ^{222}Rn sources in that area. The effect of latitude on average ^{210}Pb concentrations in ground-level air was studied for 2 successive 1-yr periods. The profile obtained for ^{210}Pb was similar to that of ^{90}Sr in the air, as measured at the same sites. The lowest concentrations of airborne radioactive isotopes were found at the South Pole. Measurements of the ratio of ^{210}Pb-^{222}Rn were not suitable for the determination of the time ^{210}Pb remained in the atmosphere.

Some data on the concentration of ^{210}Pb in rain water are included. Islands and coastal sites were found to exhibit lower ^{210}Pb concentrations than inland sites or sites lying in the path of continental air masses. Thus, the ^{210}Pb activity in rainwater at Samoa was 0.23 pCi/l compared to 2.5 in Glenview, Illinois.

3416 Primavesi, C.A. (Hyg. Inst. of Ruhr Area, Gelsenkirchen, Germany): Die Autoabgase und ihre Bedeutung für die menschliche Gesundheit. (AUTOMOBILE EXHAUSTS AND THEIR SIGNIFICANCE FOR HUMAN HEALTH.) Zeitschrift für Präventivmedizin 9:148-59 (May-June), 1964.

The significance for human health of automobile exhaust gases, such as CO, Pb compounds and carcinogenic agents, is discussed and precautionary measures are suggested. It has been estimated by Hettche (1961) that 35% of air pollutants are attributable to industry, 42% to domestic heating and 20% to automobile exhausts; in some large American cities, automobile exhausts may contribute even 60-80%.

CO is emitted practically solely by gasoline motor vehicles. The CO concentration at metropolitan traffic centers in Germany av 15 ppm, though in the industrial Ruhr area sporadically values of 200 ppm have been noted. Pb as chloride and bromide, of a particle size of 0.68-2.70 µ, is emitted in the automobile exhausts through the addition of TEL as antiknock in the fuel. In the environment of the Institute for Hygiene in Gelsenkirchen, the author found atmospheric Pb concentrations of 0.5-3 µg/m^3; Dubrowskaya's (1960) values from Russia ranged around a few µg/m^3, while American cities with heavy automobile traffic report 30-40 with a rush-hour peak of 120 µg/m^3. In Switzerland, atmospheric Pb levels are generally <5 µg/m^3. The prohibition of adding Pb to fuels, in force until 1947, has been abolished because the amounts were too small to constitute a health hazard. The MAC of Pb in work places in Germany is 150 µg/m^3; this, however does not apply to pollution of the general atmosphere. The blood of normal man contains 20-30 µg Pb/100 ml. The toxic threshold of 50-60 µg/100 ml has not even been reached by individuals particularly exposed to exhaust gases, but Hofreuter observed that city people have a higher Pb blood level (av 20 µg/100 ml) than the rural population (av 14 µg/100 ml). According to the author's observations, the average Pb concentration in the blood of healthy subjects has been increasing slightly during the last few years though remaining still far below the toxic threshold. But he questions whether, with increasing use of motor vehicles, critical values may not be reached some time.

Among cancerogenic substances, emitted as automobile exhausts, benzpyrenes and anthracenes present the greatest hazards. These polycyclic hydrocarbons reached concentrations of 330 µg/1000 m^3 in Hamburg during winter and in Liège and Bologna values of 360 and 200, respectively, were measured. These levels are much lower during summer, decreasing for example in Bologna to 6 µg/1000 m^3. At the present time, a relation between automobile exhaust gases and lung carcinoma could not be proved experimentally although statistics seem to indicate such a relationship.

The author next considers the possibility of additive or synergistic action of the individual components of the exhausts, which may be even higher than the sum of the effects of the individual components. Apprehensive of a situation in European cities such as had been reported for California, he advocates the installation of filter or afterburner equipment in motor vehicles. He also suggests exhausting the gases through the roof of the vehicles as some trucks already do, instead of having the exhaust pipe several inches above the ground, in the breathing level of children and infants. Careless and faulty emission of exhaust gases should be forbidden by law and a continuous monitoring of air pollutants should become mandatory in all cities.

3417 Pulewka, P. (Univ. Tübingen, Germany): Vergiftungen im Beruf. (OCCUPATIONAL POISONINGS.) Medizinische Welt 44:2355-63 (Oct. 31), 1964.

This paper was given as part of a symposium on "occupational diseases" on May 30, 1963, at the University of Tübingen, Germany. Various toxic substances occurring in industry are discussed and the following is said concerning Pb: Chronic Pb intoxication caused by the inhalation of Pb-containing dust has occurred frequently but due to sanitary measures this hazard has decreased. However, a new hazard has developed by the increase of motorized traffic. Pb alkyls such as TEL are added to motor fuel and after combustion exhausted as Pb chloride or bromide or are deposited in the motor. Chronic Pb poisoning may occur in places where automobile or plane motors are cleaned. The atmosphere in large garages is also harmful when inhaled over a prolonged period of time. Whether the amount of Pb in street dust has already reached a critical threshold, is a matter of argument.

3418 Robinson, E., and Ludwig, F.L. (Stanford Res. Inst.. Menlo Park, Calif.): SIZE DISTRIBUTIONS OF ATMOSPHERIC LEAD AEROSOLS. Stanford Research Institute Project No. PA-4788, Final Report, April 30, 1964, 36 pp.

This report covers Pb aerosol sampling carried out during the winter of 1964 in several midwestern and eastern areas of the US. It also includes the description of a change in the size distribution calculation used in the previous report (1963). From all of the analyses of Pb aerosol size distributions, the conclusion was drawn that a single average size distribution can be used to characterize atmospheric Pb aerosols, regardless of geographical location. The mass median diameter is 0.25 µ, upper and lower quartile points are 0.16 and 0.45 µ, and relatively little of the total mass is larger than 1 µ.

3419 Selegean, E., and Barnea, M. (Inst. Igiena Protectia Muncii, Bucharest, Romania):

Raspîndirea plumbului și zincului in atmosfera din jurul topitoriilor de metale neferoase. (DIFFUSION OF Pb AND Zn IN THE AIR AROUND NON-FERROUS METAL FOUNDRIES.) Igiena (Bucharest) 13, No. 2:137-44, 1964.

The contamination of the atmosphere, soil and vegetation at a location ~3 km from 2 Pb smelters was studied. Pb, Zn, Cd and Al were determined polarographically on 1 polarogram. The air was passed through a 1-4% solution of nitric acid, the nitric acid was then evaporated and the salts were transformed into chlorides and polarographed in a 2% solution of citric acid in an atmosphere of pure N.

Concentrations of Pb in the atmosphere ranged from 2.5-200, and of Zn, 8.0-700 $\mu g/m^3$. Dust settled in containers on the ground had a Pb content from 0.42 to 2.82%. Soil at 200 m from the source contained 495 mg Pb/g and 385 mg at 4000 m. At 2-km distance, the Pb content in cherry leaves and in grass was 7.66 and 0.628 mg/kg, respectively. Atmospheric pollution was reduced by 90% by passing the smelter fumes through a 100-m tunnel, then through an 80-m high stack.

The possibility of absorbing excessive amounts of Pb and the metabolism of Pb are briefly discussed.

3420 Stern, A.C. (US Publ. Health Service, Washington, D.C.): SUMMARY OF EXISTING AIR POLLUTION STANDARDS. Journal of the Air Pollution Control Association 14:5-15 (Jan.), 1964.

The author discusses air quality standards (AQS), specifications, and threshold limit values; procedures used in setting such standards in USSR and in West Germany as compared with the US; application of the zoning concept to these standards; procedures used for setting emission specifications in West Germany, and American emission standards; single-valued vs multi-valued emission standards, and application of the zoning concept to emission standards. Included among the 19 tables is 1 showing New York State surface water classification for the purpose of assigning standards of quality and purity.

The conclusions of this presentation are as follows: The averaging time incorporated in an ambient AQS must be carefully chosen with relation to the effects of excessive air pollution intended to be prevented by the imposition of the standard. The relationship between an emission standard and the AQS for the pollutant emitted is complex. For administrative purposes, it is preferable that both standards be stated in as simple terms as possible, even though this may result in a departure from the actual relationship between them. Where an attempt is made to include this relationship, the recommended combination is for the AQS to be stated in simple form; the emission standard to be in as complex format as necessary for validity. The application of the zoning concept to both ambient AQS and emission standards appears to be fundamentally unsound. Nevertheless, some applications of zoned ambient AQS may be justified where buffer zones are employed; and some applications of zoned emission standards justified to the extent that they allow those standards which are feasible now to be imposed now.

3421 Stöfen, D. (Montabaur, West Germany): Ermittlung von Bleiträgerschaft bei Kindern aus der Umgebung eines Weiterverarbeitungsbetriebs für raffiniertes Blei. (STUDY OF THE LEAD BURDEN IN CHILDREN LIVING IN THE VICINITY OF A FABRICATOR OF REFINED LEAD.) Zentralblatt für Arbeitsmedizin und Arbeitsschutz 14:141 (June), 1964.

D.D. Smirnov's publication in 1962 (Abstract No. 3011) concerning a study of 263 children from nurseries and kindergartens situated in the vicinity of a fabricating plant for refined Pb is reviewed. The report records incipient calcification of long bones seen in X rays of 48 children, together with urinary Pb of 0.01-0.028% in 27 of them. Stöfen remarks that West German readers will wonder why the urinary Pb was measured rather than the urinary CP. The same procedure was followed by A.S. Zykova in her paper on pollution of the atmosphere with Pb and its effect on the health of the population. (Gigiena i Sanitariya No. 2:12, 1957, reviewed in Zentralblatt für Arbeitsmedizin und Arbeitsschutz 13:39-40 (Feb.), 1963). As Smirnov found more Pb in coal ash in the contaminated area, Stöfen wonders whether this is not derived totally or partially from the atmospheric Pb dust instead of from the soil. He also regrets that the state of the children's health was not described, nor were the climatic conditions (duration of dry periods, summer temperatures) considered for a country with such vast differences in climate as the USSR. In hot, dry weather, Pb contained in the soil is inhaled along with the dust. Otherwise, the reviewer commends Smirnov's report and recommends that a similar study be made in West Germany.

3422 Timofeeva, L.V., Sadilova, M.S., and Kuperman, E.F. (Inst. Gig., Sverdlovsk, U.S.S.R.): (POLLUTION OF ENVIRONMENTAL ATMOSPHERE BY PLANT WASTES OF FERROUS AND NONFERROUS METALLURGY AND CHEMICAL INDUSTRY.) Okhrana Prirody Urale, Ural. Filial Akademii Nauk SSSR 4:19-36, 1964.

Air pollution studies in industrial regions of the Urals during 1950 to 1962 showed that dust, SO_2, C oxides and phenols exceeded the admissible norm so that people suffered from diseases of the upper respiratory tract. Values were also given for the average and maximum concentration of F, Cr, Pb, As, Cl, H chloride and N oxides at various distances from industrial plants. (From Chemical Abstracts 67:Abstr. No. 14654, 1967)

3423 World Health Organization: ATMOSPHERIC POLLUTANTS REPORT OF A WHO EXPERT COMMITTEE. WHO Technical Report Series No. 271, 1964, 18 pp.

The Expert Committee, at a meeting in Geneva October 15-21, 1963 discussed the following topics in relation to air pollution: progress made in control; problems of international interest; international standardization· nomenclature, units and methods of measurement; criteria and guides for air quality; evaluation of recent investigations and research; recommendations for futher action. Reference was made to the 5th report of WHO Expert Committee on Environmental Sanitation (1958) for background information. Pb is not mentioned specifically, but need for control of emissions from motor vehicles is stated under several of the above headings.

B. SOIL AND WATER

1950

3424 Müller, J. (Dresden, Germany): (PROTECTIVE COATINGS IN LEAD PIPES FROM VERY SOFT WATER.) Gesundh.-Ing. 71:325-32, 1950.
The formation of protective coatings on Pb pipes under various conditions (water treatment, CO_2 content, etc) and the composition of the coating (Pb carbonate, phosphate, silicate) are discussed. In conclusion, it is stated that there is a possibility that an external thin, Pb rich layer found on the coating could come loose in household piping and form a suspension in the water which would be harmful to health. (From Chemical Abstracts 45:3535, 1951)

1951

3425 N. V. Keurings-Instituut Voor Waterleidingartikelen: Rapport inzake het onderzoek van loden en gelegeerd loden buizen. Grafieken behorende bij het rapport inzake het onderzoek van loden en gelegeerd loden buizen. (REPORT ON THE STUDY OF LEAD AND LEAD ALLOY PIPES. GRAPHS RELATING TO THE REPORT ON LEAD AND LEAD ALLOY PIPES. ENGLISH SUMMARY OF THE REPORT CONCERNING THE INVESTIGATIONS INTO PIPES OF LEAD AND LEAD ALLOYS CARRIED OUT BY THE "NON-FERROUS METALS RESEARCH COMMITTEE" OF THE K.I.W.A. LTD.) 1950, 1950, 1951, 66 pp., 23 graphs, 8 pp. (SUMMARY.) Tech. Eau, Bruxelles 5, No. 58:27-9, 40, 1951.
Studies by the above Institute on the amount of Pb which passes into various types of water in distribution systems constructed of Pb and Pb alloys showed that, with the exception of pipes carrying dune water, there was little difference in the amount of Pb dissolved from pure Pb and Pb-alloy pipes. Amount of Pb dissolved from Pb-alloy pipes was much greater when dune water was transported. In stagnant water most of the Pb was dissolved during the 1st few hours. Concentration of Pb in old distribution systems was found to be less than that in recently constructed water mains. (From Water Pollution Abstracts 25:Abstr. No. 846, 1952)

3426 Royer, V.: (EXPERIMENTAL PART OF THE STUDY ON THE DETERMINATION OF LEAD.) Bull. Centre belge Ét. Document. Faux 13: 170-3, 1951.
Using the dithizone method, experiments were made to determine the concentration of Pb in 4 different water supplies after the water had remained in Pb pipes for 8 hr and after the water had been flowing for some time. After standing for 8 hr the concentration of Pb varied from 0.06-0.496 ppm. Detailed results of the decrease in concentration of Pb after the water had been flowing for various periods are shown in graphs. (From Water Pollution Abstracts 25:1968, 1952)

3427 Schmitt, M.: (REMOVING LEAD FROM WATER.) French Patent 980,709, May 17, 1951.
Water containing Pb was treated with an alkaline earth carbonate and then filtered through a bed of Ca carbonate or a similar substance to remove both the precipitate of Pb salt and the free CO_2. Before filtering, an alkaline earth oxide may be added to remove free CO_2, and a final filtering may be effected through active C. (From Chemical Abstracts 47:8950, 1953)

1952

3428 Müller, J(osef) (Munich, Germany): Bedeutsame Feststellungen bei Grundwasserverunreinigungen durch Benzin. (CONTAMINATION OF GROUND WATER SUPPLIES BY GASOLINE.) Gas- und Wasserfach 93, No. 8:205-9, 1952.
Ground water contamination by gasoline in the vicinity of Munich, 1 case in 1939 (4000 l. with a strikingly high degree of nitrite and only a trace of nitrate) and 1 in 1940 (670,000 l. containing TEL) from leaks in underground gasoline storage tanks affected the drinking water drawn from wells in nearby residential areas. The first signs of the contamination were gasoline-like taste and odor of the water. The water from the affected wells was examined and the area of contamination found to be less extensive than initially expected. The contaminated wells were closed for public usage and the residential areas connected to the city water supply lines pending examination of the cause of the contamination and correction.

The gasoline had penetrated the soil for a distance of $\sim$2.5 km. In chemical analysis, it was surprising that the gasoline had mainly caused a reduction in the nitrates, a reaction not achieved under laboratory conditions but evidently easily accomplished in the ground, giving rise to the intermediary product, nitrite. Formation of ammonia did not ensue. Pb content, examined by the dithizone method, was not found in the 1st 2 yr of the contamination period. The highest value established was 0.05 mg/l. In February 1942, the highest Pb value was 0.4 mg/l but in 1943 no Pb was found except in some isolated cases at the negligible level of 0.02-0.1 mg/l.

Nitrate reappeared in considerable amounts after 2 yr, justifying the assumption that no significant amount of gasoline was present in the soil. In 1943, tests in case 1 showed the water to have returned to normal. Gasoline taste and odor had disappeared as early as May 1941. In case 2, where the gasoline contamination had largely disappeared by the summer of 1942, "hydraffrin" filters were installed in those wells still affected by gasoline taste and odor with satisfactory results. However, in June 1944 in both cases, a slight gasoline odor and reduction in nitrate content recurred in the well water believed to be the result of the strong precipitation occurring in June of that year which activated the gasoline in those portions of the soil not reached by the ground water.

After the end of World War II, tests on the basis of an isolated complaint concerning oily spots in drinking water showed that the spots were not the result of gasoline but most likely the residue of fatty foods cooked or stored in the containers which had not been entirely removed by washing. The ground water was found to be normal. Pb exposure or Pb intoxication was out of the question in these 2 cases of considerable gasoline leakage, since the population was supplied with normal drinking water during the period of contamination and since the well waters did not contain any significant amount of Pb.

1953

3429 Doudoroff, P., and Katz, M. (Environ. Health Center, U.S. Public Health Ser., Cincinnati, O.): CRITICAL REVIEW OF LITERATURE ON THE TOXICITY OF INDUSTRIAL WASTES AND THEIR COMPONENTS TO FISH. II. THE METALS, AS SALTS. Sewage and Industrial Wastes 25:802-39 (July), 1953.

The review of 155 publications includes Pb.

3430 Gad, G., and Naumann, K. (Inst. Water, Soil, and Air Hygiene, Berlin-Dahlem, Germany): (AVOIDING LEAD POISONING FROM NEWLY INSTALLED LEAD PIPE.) Gesundh.-Ing. 74:85-7, 1953.

Treatment of Pb pipe with a solution containing 30 ml Na silicate (40-42°Be)/1 for 48 hr formed a protective layer that prevented solution of Pb when distilled water saturated with CO_2 was passed through the pipe. Na phosphate gave no protection. Na_2HPO_4 was partly effective, and a mixture of Na silicate and Na_2HPO_4 was not as effective as Na silicate alone. (From Chemical Abstracts 47:11612, 1953)

3431 Sushinskaya, L.Ya. (Irkutsk Med. Inst., USSR): Stabil'nost svintsa v vode. (STABILITY OF LEAD IN WATER.) Gigiena i Sanitariya 1953, No. 8:49.

As determined in laboratory experiments, using Pb nitrate in concentrations of 1, 10, and 50 mg/1, the best absorbent for dissolved Pb in water was found to be clay. Pb solutions are completely stable in neutral or acid solutions, but in alkaline solution (pH 8.4) Pb content gradually precipitates on standing in contact with air. For removal from industrial liquors an alkaline solution in combination with clay adsorbent is recommended.

1954

3432 Drobeck, W.: (THE HAMBURG WATER SUPPLY.) Gas- u. Wasserfach 95:650-7, 712-18, 1954.

Problems in the interconnection and unification of 17 different waterworks supplying Hamburg are described. Pb, Cu, and cast Fe service pipes are used. Unprotected steel corrodes rapidly; water fast removes Zn coating from galvanized Fe; plastic pipe is promising for services <2 m, but requires improvement before full use can be made. Pb is believed to offer no health hazard; when pipe is new, water standing overnight should be discarded. Laboratory tests are being carried out to determine the actual amount of Pb dissolved under such conditions. (From Chemical Abstracts 49:1995, 1955)

1955

3433 National Sanitation Foundation: A STUDY OF PLASTIC PIPE FOR POTABLE WATER SUPPLIES. Directed by W.D. Tiedeman, and assisted by N.A. Milone. Ann Arbor, University of Michigan School of Public Health, 1955, 90 pp.

Twenty-two different samples of plastic pipe extruded from definite formulations of polyethylene (PE), polyvinylchloride (PVC) including saran, rubber modified polystyrene, and cellulose acetate butyrate were tested under the following conditions: Aggressive water (Ann Arbor water, considered to be as aggressive as any of the natural waters, was selected because of pH, high Cl, high natural F, hardness, high mineral, sulfate and bicarbonate contents; pH was lowered to 5 to make it more aggressive in the extraction of heavy metals); effect of weathering; of burial in soil; prolonged submersion in water; extraction tests. In the latter, cut specimens were immersed in water; special samples were prepared of a PE electrical insulation compound and a PVC compound containing Pb and Cd. Enough color was extracted from the PE to turn the color of the water orange-brown. From the PVC sample, 0.34 mg/1 Pb was extracted at natural pH 9.6, and 1.25 mg/1 when the pH was lowered to 5. However, <6% as much Pb was extracted from the PVC pipe at pH 9.6 than from Pb pipe under similar conditions. Special samples were also prepared to contain varying quantities of Pb, Cd and Ba much greater than was likely to be used in making plastics. Pb extracted from 1 sample was 2.4 ppm, and from another sample containing twice as much Pb, 3.90 ppm. Similarly, 0.15 ppm Cd was extracted from 1 sample containing Cd and Ba, and 0.30 ppm from 1 containing twice as much Cd. No Ba was detected. Other chemical constituents of the water were not changed. In addition to these tests, taste and odor were examined and effect on Cl residuals. In animal feeding tests, rats received their drinking water from plastic pipes. The results showed that such exposure for 18 mo gave no evidence of any trouble insofar as growth, food consumption, and autopsy findings were concerned. Separate experiments with rats fed water in contact with the special specimens of plastic pipe containing Pb, Cd, and Ba, showed no excessive amounts of Pb in the blood at the end of the feeding period. All pipes tested showed susceptibility to rodent attack.

1956

3434 Pariaud, J.C., and Archinard, P.: Essai d'interprétation théorique de la solubilite des metaux dans l'eau. (THEORETICAL INTERPRETATION OF THE SOLUBILITY OF METALS IN WATER.) Journal de Chimie Physique et de Physicochimie Biologique 53:765-9, 1956.

An attempt is made to interpret the observed solubility limits of 5 metals, including Pb, in water. The hypotheses of direct ionization of metal, or of formation of colloidal metal particles are shown to be untenable.

1957

3435 Butler, E.J., Nisbet, D.I. and Robertson J.M. (Moredun Inst., Edinburgh; West of Scotland Agric. Coll. Auchincruive, Ayr, Scotland): OSTEOPOROSIS IN LAMBS IN A LEAD MINING AREA. I. A STUDY OF THE NATURALLY OCCURRING DISEASE. Journal of Comparative Pathology and Therapeutics 67, No. 4:378-96, 1957

An osteoporotic condition of young lambs which had occurred regularly for many years in an old Pb mining area in South Scotland is described. The study was carried out on the lamb crops of 3 yr, ie, 1953, 1954 and 1955 on 7 farms. Although Pb content of soil and pasture (19,500-17,800 ppm and 162-764 ppm, respectively), and blood (70.3 µg/100 ml), liver (58.2 ppm), kidneys (77.0 ppm), and bones (275-314 ppm) of many affected lambs was unusually high, lambs with osteoporosis did not present a classical pathological picture of chronic Pb poisoning. In lambs with higher Pb values there was basophilic stippling of red cells and acidophilic inclusion bodies were present in liver and kidney. Unusually high values for Zn were found in blood and tissue of affected lambs. Possible involvement of these elements and chelating metabolites such as vitamin C in the etiology of the disease is discussed. (59 references)

3436 Buydens, R. (Brussels Intercom. Water Comp. Lab., Belgium.): Du danger de saturnisme par l'addition de phosphates condensés aux eaux de distribution incrustantes. (DANGER OF LEAD POISONING BY ADDING CONDENSED PHOSPHATES TO HARD WATER SUPPLY.) Bulletin de l'Académie Royale de Médecine de Belgique 22, No. 6/7:293-318, 1957.

A mixture of Na pyro- and metaphosphates is often added to a water supply to avoid scale formation in the piping system. Phosphates inhibit precipitation of Ca carbonate and corrosion of metals. However, it was shown experimentally, using a piece of Pb pipe 2.25 m long, that by this procedure Pb content of water increased above the tolerated limit.

3437 Cairns, J., Jr. (Acad. Natural Sci., Philadelphia, Pa.): ENVIRONMENT AND TIME IN FISH TOXICITY. Industrial Wastes 2:1-5 (Jan.-Feb.), 1957.

In introducing his discussion, the author notes that a common fallacy that fish will avoid an area contaminated by industrial wastes, is not always true; eg, it had been found that fish appeared to be lured to gas-polluted water. He discusses the relationship between fish toxicity and temperature, dissolved oxygen, synergism and antagonism, time and toxicity, and alteration of washes in streams, by illustration with experimental work of the Academy of Natural Sciences of Philadelphia. Among this, it was found that concentrations of TEL too low to cause death immediately will do so with prolonged exposure; that death occurred when a fixed concentration was reached in the fish's body. The concentration in the dilution water was important only with respect to the time interval required to produce a kill.

1958

3438 Buydens, R. (Laboratory of Intercommunal Water Board, Brussels, Belgium): (EFFECT OF PLASTIC PIPING ON THE QUALITY OF POTABLE WATER.) Bull. centre belge étude et document. eaux (Liège) No. 40 84-8, 1958.

The amount of Pb extracted from various plastic hose by water adjusted to pH 4.5 with C dioxide varied with the type of plastic, the temperature of the water, and the wettability of the plastic surface. The public health aspects of the results and the specifications for plastic hose for water transmission were discussed. (From Chemical Abstracts 53:1605, 1959)

3439 Drábek, B.: (WASTE WATERS FROM PLANTS FOR THE TREATMENT OF LEAD AND ZINC ORES.) Rudy (Prague) 6:354-7, 1958.

From Czechoslovakian examples the operation and efficiency of treatment plants for waste waters from the preparations of Pb and Zn ores are described. As most of the works are situated on small streams, recirculation of water is important. (From Chem. Zbl. 131:1971, 1960; Water Pollution Abstracts 35:Abstr. No. 1200, 1962)

1959

3440 Beilikhis, G.A., Lapisova, N.P., and Parshina, A.M.: WASTE WATER CONTAINING TETRAETHYL LEAD. Gigiena i Sanitariya 24, No. 2:27-31, 1959. In Levine, B.S.: U.S.S.R. Literature on Water Supply and Pollution Contol. Washington, US Department of Commerce, Office of Technical Services, 1961, Vol. 1, pp. 191-7.

The authors start the discussion by saying that although the problem of waste water pollution with TEL is of primary importance, it has not been dealt with adequately. Grushko, and Elizarova and Zamyslova, who had studied this subject, gave contradictory results; the 1st, whose experiments involved only 1 or 2 animals/concentration of TEL, indicated a concentration of 0.001 mg/l as eliciting barely perceptible or negligible pathologic changes, whereas E. and Z. regarded 0.0002 mg/l as the minimal active concentration. Next discussed are methods for the purification of TEL-polluted effluents as developed by Lisitsin and Parshina and others, and an installation using Na sulfide treatment is diagrammatically illustrated. A removal method had also been developed by Rodnevich for crude oil distillation plants which produce ethyl gas. While sanitary regulations related to storage, transportation and use of ethyl fluid prescribe the construction of discharge outlets, there are no sanitary requirements to cover the waste water from those points on. The regulations pertaining to decontamination of soil are considered to be inadequate. The author suggests that they be revised or amended.

The conclusion is that since the minimum active TEL concentration in waste water is 0.0002 mg/l, purification must be nearly complete and, in accordance with the present degree of sensitivity of analytical methods, must be diluted to not less than 1:1000 before the water is run into natural water basins. In the author's opinion, effective purification is possible; also, a considerable volume of the water can be reutilized at different industrial stages without having been purified. Secondary waste water from gasoline storage centers can be successfully freed of TEL by the method of Rodnevich.

3441 Elkins, H.B. (State Div. Occup. Hyg., Boston, Mass.): THE LEAD CONTENT OF WATER FROM RED-LEAD PAINTED TANKS. Industrial Medicine and Surgery 28:112-4; discussion, 114-6 (Mar.), 1959.

Ninety analyses for Pb were made of water from 11 standpipes painted with red Pb. The greatest number of samples contained <0.005 mg/l. A small number contained 0.006-0.010 mg/l and an approximately equal number 0.011-0.02 mg/l. Two samples contained between 0.02-0.05 mg/l. Tests of the extraction of Pb from panels coated with red Pb oil paint indicated that no significant quantity of Pb will be added to the average water supply by the paint if the average daily consumption approaches the capacity of the tank. If a phenolic base paint with red Pb pigment is used, a substantially lower rate of turnover will keep the Pb concentration below significant levels. Available evidence indicates that only in extremely exceptional conditions, if at all could the Pb paint produced a hazard to health. (From author's summary).

3442 Elkins, H.B.: LEAD CONTENT OF WATER FROM TANKS PAINTED WITH RED LEAD. Journal of the American Water Works Association 51: 570-4 (May), 1959.

See preceding abstract.

3443 Fraser, D.A., and Fairhall, L.T. (US Pub. Health Serv., Cincinnati, O.): LEAD DISSOLUTION FROM RED-LEAD PAINTS IN WATER. Journal American Water Works Association 51:561-9 (May), 1959.

The effects of a number of variables on Pb solubility were studied for oil-, phenolic- and vinyl-base paints. The oil-base paint was found to be at least 10 times more soluble under the conditions of the test than either of the other two. It is noted that the oil-base paint did not contain the added litharge found in current specifications.

3444 Fraser, D.A., and Fairhall, L.T. (Cincinnati, O.): LABORATORY STUDY OF THE SOLUBILITY OF RED LEAD PAINT IN WATER. Public Health Reports 74:501-10 (June), 1959.

The solubility of red Pb powder and of Pb from red Pb paint of linseed oil, phenolic or vinyl base was studied. The solubility of purified red Pb in distilled water was found by analysis to be 8.9 x 10^{-7} g M of Pb_3O_4/l (0.553 ppm) at room temperature. The uptake of Pb by water standing in contact with oil base red Pb paint varies with the length of contact and the amount of Pb dissolved by water varies inversely with the time of drying of the paint film. The leaching is a surface effect and the dissolution of Pb tends to reach a constant value. Na hexametaphosphate reduces the rate of Pb solvency in distilled water within the range of concentration used in treating public water supplies while at >15 ppm it increases its solubility. Na hydroxide up to 25 ppm depresses the rate of Pb solution.

3445 Kurennova, A.M., and Selitrennikova, M.B.: (THE DISPOSAL OF WASTE WATERS OF THE ALMALYK LEAD-ZINC BENEFICIATION PLANT.) Trudy Uzbek. Nauch.-Issledovatel. Sanit. Inst. 1:73-80, 1959.

Waste waters from the flotation of sulfide ores contained 0-14.8 mg Pb/l while the waters from oxidized ores showed no Pb. (From Referat. Zhur., Khim. 1960, Abstract No. 89040; Chemical Abstracts 55:14768, 1961)

3446 Stolbov, F.N.: (TREATMENT OF TECHNICAL WASTE WATERS OF THE LEAD COMBINE SYRYANOVSK.) Soviet Journal of Non-Ferrous Metals 32, No. 3:5-8, 1959.

Waste waters from the collection and treatment of ores contain Pb and other substances. Mixing with domestic sewage reduces the percentage content of harmful substances and produces conditions for biological decomposition without the use of a biofilter plant. Chlorination is used for preliminary treatment, combined, for recovery of metals, with electrolysis. (From Chem. Zbl. 131:2991, 1960; Water Pollution Abstracts 35:Abstr. No. 1199, 1962)

1960

3447 Chancellor, S.F. (Bakelite, Ltd., Tyseley, Birmingham, England): TOXICITY OF PLASTICS. Nature 185:841 (Mar. 19), 1960.

The leaching of Pb compounds from Pb-stabilized polyvinyl chloride compositions in contact with a constant volume of hard and soft water was investigated. Six liters of water were stored at room temperature in tanks 18x12x15-in. deep made from the sample material by welding press-polished sheet. After 18 mo contact, it was shown that, with a compound stabilized with 3.77% basic Pb phosphite and lubricated with 0.95% basic Pb stearate, 0.5 ppm Pb was extracted by soft water and no Pb by hard water, while a compound containing only 3.81% dibasic Pb phosphite had none of its Pb extracted by either hard or soft water. Thus only some types of Pb compound are extracted from these compositions by water. It is concluded that polyvinyl chloride compositions should not be condemned as being toxic just because they contain toxic substances, but should be considered in light of the applications for which they are intended.

3448 Gill, J.M., Huguet, J.H., and Pearson, E.A. (Ethyl Corp., Pittsburg, Calif.; Baton Rouge, La.; Berkeley, Calif.): SUBMARINE DISPERSAL SYSTEM FOR TREATED CHEMICAL WASTES. Journal of the Water Pollution Control Federation 32:858-67 (Aug.), 1960.

In view of an expansion program of the Ethyl Corporation, permission was obtained for discharge of residual process and sanitary wastes into the water of the New York Slough near Pittsburg, Calif. An estimate of the plant's effluent characteristics was made and because of some concern as to possible or relative toxic characteristics, representative samples of waste, simulating the proposed discharge, were collected and used for preliminary bio-assays with fish. Relatively low levels of toxicity were determined, and it was found that the toxicity degree was significantly reduced when seawater was used as the diluent.

Along with background Pb concentrations in the receiving water as well as in the bottom sediments, additional chemical and biological observations were made. Although occasional high spot values were observed, most results were well below or within the recommended level of 0.05 mg/l of total Pb. The Pb concentrations of bottom sediments varied from as low as 2-3 mg/l to 76, 129 and 250 mg/l. It appeared that the values obtained were fairly representative of the concentrations and variations reported by earlier investigators of similar soil and sediment samples. The waste characteristics were prescribed by the Regional Water Pollution Control Board of the San Francisco Bay and water quality criteria were specified, including Pb, with a maximum concentration of $\leq$0.5 mg/l, 1/2 mi from the diffuser, and a median of $\leq$0.3 mg/l, from 3 or more representative samples 100 ft downstream from the diffuser. Pb in the bottom sediments 100 ft beyond the geometric center of the diffuser as reported by the median of 5 samples was limited to a maximum of 1 mg/l greater than the median of 5 similar samples taken in a control area 1/2-3/4 mi from the diffuser. Pb accumulation or increase in the median of 5 bottom samples was limited to 0.1 mg/l yr maximum.

3449 Kozyura, A.S., Mirnaya, A.P., and Lad, M. D.: (DECONTAMINATION OF WASTE WATERS CONTAINING TETRAETHYLLEAD.) Tr. Ob'edin. Seminara po Gidrotekhn. i Vodokhoz. Stroit., Kharkov 1959, No. 2:64-8 (Pub. 1960).

The waste water, after passing through an oil separator, is acidified and passed for 1 hr through a reduction column packed with Fe shavings, where TEL is decomposed into ethane and Pb. The water is then neutralized with 10% Ca hydroxide, settled for 2 hr, diluted with relatively clean water, and discarded. (From Chemical Abstracts 58:337, 1963)

3450 Nebel, I.U. (Sci. Lab. Dynamit Nobel A.G. Troisdorf, Germany): Bleibestimmung im Wasser aus öffentlichen Versorgungsleitungen. (DETERMINATION OF LEAD IN WATER FROM PUBLIC WATERWORKS.) Angewandte Chemie 72: 322, 1960.

Photometric analyses showed no Pb in the water from polyvinyl chloride pipelines which were in service for 6-18 mo, and 50 μg Pb/l in water passing through a 6 m-Pb pipe (sensitivity of method 4 μg Pb/100 ml). The limit of tolerance for Pb is given as 100 μg/l in circulating and 300 μg in standing water.

3451 Schmeling, E.L., and Röschenbleck, B. (Natl. Bd. Mat. Res. Westphalia, Dortmund/Aplerbeck, Germany): (CORROSION OF LEAD PIPES.) Korrosion 12:83-6, 1960.

Pitting of the external surface of Pb water pipes was noted; in many cases this was accompanied by surrounding or adjacent white deposits, sometimes edged with black deposits. The black deposits were Pb sulfide, and the white deposits basic Pb carbonate. Such pitting did not occur when ground waters carried sufficient Ca bicarbonate to form a protective coating. The use of Pb should be avoided in S-containing salts, especially where H sulfide is being formed, and also for potable water supplies of low hardness. The danger of differential aeration must also be considered. (From Chemical Abstracts 54:24288, 1960)

3452 Shtern, M.A., and Gorelik, G.N.: (PURIFICATION OF WASTE WATERS IN THE MANUFACTURE OF ZINC AND LEAD CHROMATES.) Lakokrasochnye Materialy i ikh Primenenie 1960, No. 6: 34-8.

At a pH of 10-11 obtained by adding milk of lime to the waste water, satisfactory results are obtained with Pb sulfate by using 3-10% excess, 100-200% excess being permissible. (From Chemical Abstracts 55:14769, 1961)

3453 Stones, T. (Sewage Dept., Salford, England): FATE OF LEAD DURING THE TREATMENT OF SEWAGE. Inst. Sewage Purif., J. Proc. 1960, Part 2:221-3.

Tank sedimentation reduced Pb content (~0.62 ppm) of sewage by 40.3%. By using sterilized control samples, it was ascertained that ~8% of the removal is due to biological activity. In biological filtration ~70% Pb in the filter feed was recovered in the effluent. Of this ~80% was contained in the human solids and 20% in the liquor. Film washed from the surface medium of the filters contained 0.075% Pb on a dry basis. Activated sludge treatment removed ~90% Pb, the rest passing out with the effluent. (From Chemical Abstracts 55:5822, 1961)

3454 Zimmermann, W.: Gefährdung der Trinkwasserversorgung durch Versickerung flüssiger Brennstoffe. (DANGEROUS POLLUTION OF THE DRINKING WATER SUPPLY BY FLUID FUEL.) Öff. Gesundh.-Dienst 22, No.4: 119-24, 1960.

The steady increase of fuel tanks causes contamination of the soil and the sub-soil water. In West Germany, leakages from fuel tanks amount to ~2000-20,000 m^3/yr; theoretically, this quantity could render 20 milliard m^3 of water unfit for drinking. One part of fuel putrefies ~1 million parts of water. The possibility of an enrichment of Pb in soil by oozing of Pb-containing gasoline is stressed. The effects of this penetrated fuel on the soil, its bacteria, nitrification, etc, are also discussed, and some preventive measures are suggested. (From Excerpta Medica, Sect. 17, 7: Abstr. No. 2696, 1961)

1961

3455 Axt, G.: (CARBON DIOXIDE EQUILIBRIUM IN THEORY AND PRACTICE.) Vom Wasser 28:208-26, 1961.

The introduction of 2 characteristic factors, the lime dissolving capacity and the lime corrosivity, is proposed for describing the behavior of water toward solid $CaCO_3$. The lime corrosivity can be considered as a function of Ca and CO_3 actually present in the water. The Pb dissolving capacity of a water can be estimated by means of the concentration of CO_3 considered till now as an unessential component of the bound CO_2. The concentration of CO_3 can be calculated by means of the HCO_3 concentration, and the pH. The quantities of chemicals in the treatment of drinking water can be described in the form of equations. The activity coefficient can be described as simple functions of the hardness of water. A simple method of determining the concentrations of CO_2 and CO_3 and of the lime corrosivity by means of nomograms is given. (From Chemical Abstracts 61: 1612, 1964)

3456 Gockel, H.: (THEORY AND PRACTICE OF SLUDGE PRECIPITATION. I.) Vom Wasser 28: 94-7, 1961.

The rate of sedimentation of sludges can be accelerated by using organic flocculants. These substances are used in very small quantities and are to a large extent precipitated with the settling sludge so that the effect on the oxygen demand of the water is slight. From a study of the effects of some 20 commercial coagulants on different types of waste waters, the author discusses the most suitable pH values, the method of adding the coagulant, and the necessity with some waste waters of preliminary treatment before flocculation. Analyses before and after treatment are given of waste waters from galvanizing and pickling works (including Pb), leather works, textile works, and the milk industry. (From Water Pollution Abstracts 36:Abstr. No. 1850, 1963)

3457 Kehoe, R.A. (Univ. Cincinnati, O.): IMPACTS OF POLLUTION ON HEALTH. In Proceedings, The National Conference on Water Pollution, U.S. Public Health Service, Washington, D.C., December 12-14, 1960:60-6, 1961.

This discussion concerns itself with 3 aspects of the general subject of the Conference: (1) present chemical hazards to human health associated with community water supplies, (2) similar hazards which may be anticipated in the foreseeable future, and (3) what is to be done to eliminate or control these hazards. In connection with the 1st, the author mentions the bibliographic work of the Kettering Laboratory conducted in the early 50's at the behest of the Ohio River Valley Water Sanitation Commission for biochemical and toxicologic information on series of chemicals as potential pollutants of water. A series of some 28 reports were prepared through the years. These made evident the fact that toxicologic investigations, except in relation to industrial hygiene and occupation disease, have not extended into the field of knowledge concerning the effects of prolonged absorption of small quantities of ingested chemicals. In fact, only 2 contain information from which sound and durable standards for human safety and well-being can be and have been recommended, ie, F and Pb. As to the future hazards, the author points to the urgency of developing methods of recognizing the increasing complexity of modern technology with an enormous growth of the problems of waste disposal. For the control of hazardous pollution, physiologic, toxicologic and epidemiologic research is advocated, as well as the preservation, so far as possible, of uncontaminated water supplies and the regulation of drainage areas and disposal of wastes in streams so as to limit contamination of water sources within specified limits. Information for this can be obtained only by the combined and coordinated efforts of government and other public and private agencies, including the industrial.

In the discussion Dr. Kehoe was asked to comment on the possibility of Pb content in public water supplies which are used for recreation wherein motorboats using Pb-gasoline are utilized. The answer was that the small quantitity of Pb escaping from the exhaust of motorboats is minute compared to that in industrial wastes from Pb processing plants along the streams. Even this is not of great importance because the Pb content of water is generally not high enough to be a source of danger except where wastes are dumped. Under these circumstances a large portion of the Pb will separate out as a sediment; in any event, it is not likely to be carried along the stream in sufficiently high concentration. As concerns Pb contamination from spillage of gasoline, the toxicity of gasoline itself would be of more concern.

3458 Kozyura, A.S., Smirnova, A.N., and Mirnaya, A.P.: (STUDY OF THE POSSIBILITY OF DECOMPOSITION OF TETRAETHYLLEAD UNDER NATURAL CONDITIONS.) Tr. Ob'edin. Seminara po Giderotekhn. i Vodokhoz. Stroit. Kharkov 1961, No. 3:55-9.

TEL in sewage, at concentrations of 0.01-1.5 mg/1 is decomposed in time into an inorganic form; a resultant decrease in the toxicity of the sewage was confirmed by experiments with algae. For safe discharge of sewage into reservoirs of water currents or reuse, it is recommended that the sewage be allowed to accumulate for 10 days, a time sufficient for the decomposition of TEL. (From Ref., Zh. Khim. 1962, Abstract No. 121358; Chemical Abstracts 58:1233, 1963)

3459 Niklas, H., and Meyer, W. (Res. Inst. Mannesmann Co., Cologne, Germany): (MIGRATION OF LEAD FROM POLY(VINYL CHLORIDE) PIPES CONTAINING LEAD STABILIZERS.) Kunststoffe 51:2-6, 1961.

Static and flushing tests with poly(vinyl chloride) pipes with 0.8-4.5% Pb showed that most of the Pb dissolved during the first few days standing, and after several flushings, only traces of

Pb dissolved. The pipes were found to be safe for drinking water if they contain <1% Pb and are adequately flushed before use. (From Chemical Abstracts 55:11913, 1961)

3460 Pazzaglia, L., Peretti, M., and Brau, G.: (CHEMICAL POLLUTION OF PUBLIC WATER FROM AN INDUSTRIAL SOURCE IN THE PROVINCE OF CAGLIARI AND APPLIED MEASURES. II. CHEMICAL POLLUTION OF WATER COURSES, LAKES, AND SEA WATERS WITH HARMFUL EFFECTS IN AGRICULTURE AND FISHING.) Ann. Sanita Pubblica 22:671-714, 1961.
The effects of residual waters from Pb, Zn, Mn, Fe, and other enrichment plants at Cagliari, Italy, were studied. The results of 17 particular cases reported from 1946-1957, were presented. Corrective measures were suggested. (From Chemical Abstracts 57:8374, 1962)

3461 Robb, L.A.: WASTE WATER TREATING FACILITIES AT ETHYL CORP. OF CANADA LIMITED. Papers Ontario Industrial Waste Conference, 8th, 1961, pp. 90-6.
An illustrated description was given of the waste treatment facilities at the plant of the Ethyl Corp. of Canada Limited, Corunna, near Sarina, Ont., which manufactures TEL. The waste treatment system is similar to that of the parent company in the US. The effluent is diluted with cooling water before submarine discharge to the St. Clair River. (From Water Pollution Abstracts 35:Abstr. No. 1204, 1962)

1962

3462 Demidov, V.I., and Lepisa, V.G.: (PURIFICATION OF SEWAGE IN THE TEKELI LEAD-ZINC FACTORY.) Sb. Tr. Vses. Nauchn.-Issled. Gorno-Met. Inst. Tsvetn. Met. 1962, No. 7:219-25.
Data are given on the composition of shaft waters and sewage from this concentrating plant and the effect of these waters on the Tekeli and Chazha rivers. To eliminate suspended solids, shaft waters and flotation tailings should be combined and discharged into the tailings pool. Since the sewage contains 18-30 mg/l phenols, phenol frothing agents should be replaced with nonphenol agents. Shaft waters and tailing waters can be purified together in any proportion. Complete clarification of this mixed sewage is achieved in 6-8 hr. (residual suspended solids concentration 5-10 mg/l). (From Ref. Zh., Khim. 1963, Abstr. No. 71220; Chemical Abstracts 60:2631, 1964)

3463 Genkin, V.E., Bluvshtein, S.Z., and Mokina, A.A.: (PURIFICATION OF WASTE WATER.) Tsvetn. Metal. 35, No. 12:29-35, 1962.
The treatment of Pb-Zn plant waste water with $Ca(OH)_2$ is described. The waste water contained 0.5-5.9 mg Pb/l and the precipitate 4-14.6% Pb. Recommended improvements are discussed. (From Chemical Abstracts 59:1372, 1963)

3464 Klein, L. (London, England): RIVER POLLUTION. II. CAUSES AND EFFECTS. London, Butterworth & Co. Ltd., 1962, 456 pp.
In Chapter 7, J.R.E. Jones reviews the effects of river pollution on fish, mainly in connection with Pb-Zn mining wastes. In Chapter 8 on biological aspects of river pollution, H.A. Hawkes reviews the biology of stream life, and the ecclogical effects of effluents discharges, including Pb.

3465 Loshakov, Yu.T.: (SEWAGE WATERS OF CONCENTRATION PLANTS OF ORES OF NONFERROUS METALS AND THEIR INFLUENCE ON A RESERVOIR.) Tr. Khar'kovsk. Med. Inst. 1962, No. 50: 328-33.
Sewage waters of Mo-W and Pb-Zn concentration plants are similar as to their composition and their effect on the sanitary regime of the water streams. Sewage waters impart an unpleasant odor to the water; there is a complete disappearance of the odor with a dilution of 1:5000. On heating to 50° the odor is intensified. With a dilution of 1:10 sewage waters give the water a metallic taste, and with 1:50 the taste is not discernible. With chlorination of the sewage waters a chlorophenol odor appears, the intensity of which with a dilution of 1:1000 is No 1-2. With a dilution of 1:5 the biochemical processes and the development of microflora are drastically retarded; at 1:10 the biochemical processes begin to flourish and the growth of microflora is delayed; at 1:200 there is no effect on the processes. With dilutions of 1:10 the sewage waters are toxic for Daphnia (destruction sets in the first day); with 1:50 Daphnia retain life, but do not propagate; with 1:100 the effect is not noticeable. (From Ref. Zh., Khim. 1963, Abstr. No. 151170; Chemical Abstracts 60:11742, 1964)

3466 Miller, A.P. (Consultant, Community Water Supplies): WATER AND MAN'S HEALTH. U.S. Department of State, Agency for International Development, Community Water Supply Technical Series No. 5, 1962, 92 pp.
As stated by L. Baumgartner in the foreword, this publication was prepared in view of the initiation in 1959 of the development of community water supplies in many countries. The review and discussion of the subject covers: The role of water, parasites, relationship of water to other diseases, chemical substances in water with a comparison of the International and US Public Health Service Standards, radioactive materials in water. The discussion applying to Pb (pp 68-9) includes, aside from natural levels and contamination by Pb water pipes, a brief summary of sources of intake by man, with the conclusion that Pb in drinking water should be held at <0.05 ppm (US Standard, 1962) and water containing more than that should be considered unacceptable for human consumption.

3467 Van Beneden, G.: (BIOLOGICAL CONSEQUENCES OF DRAINING PEAT BOGS OF THE BARAQUE MICHEL PLATEAU (BELGIUM). EROSION OF HUMIC MATERIAL AND ITS CHELATION WITH LEAD.) Bull. Classe Sci., Acad. Roy. Belg. 48: 344-58, 1962-63.
Water from drained peat bogs (high moor) in the Hautes Fagnes of Belgium is used for drinking purposes in villages where the water pipes consist of Pb. Many cases of Pb poisoning occur. The chelating action of different types of drainage water

with Pb was tested by placing the water in a Pb pipe 4.5 m long and 1 in wide with a capacity of 1250 ml, and determining the amount of dissolved Pb after 1-hr and 16-hr contact. The water dissolved 25 mg/l of Pb after 1 hr, and 115 mg/l after 16 hr. The same water, adjusted to pH 9.0-9.5, dissolved 60 mg/l of Pb after 1 hr, and 200 mg/l after 16 hr. Removal of CO_2 did not eliminate the problem. The corrosive action of such waters is caused partly by free CO_2 but mostly by the humic materials. (From Chemical Abstracts 58:4299, 1963)

3468 Zemskov, I.F., Stepanov, A.S., and Gnezdov, V.I.: (PURIFICATION OF WATER CONTAINING LEAD CHLORIDE WITH ION-EXCHANGE RESINS.) Zh. Prikl. Khim. 35:674-6, 1962.
The purification of water containing 6.1 mg Pb chloride/l with ion-exchange resins was studied at room temperature and atmospheric pressure by filtering through columns filled with resins KU-2, KU-1, and KU-4 in the H-form. The effectiveness of KU-2 was high. Not a trace of Pb chloride appeared in the filtrate during the 1st 150 ml. (From Chemical Abstracts 57:1998, 1962)

1963

3469 Ball, H.K. (Ethyl Corp., New York): A NEW APPROACH TO LEADED GASOLINE SLUDGE DISPOSAL. Hydrocarbon Processing and Petroleum Refiner 42, No. 5:147-8, 1963.
(This is an abstract from "Method of disposing of sludge from leaded gasoline storage tanks," presented by the author to the API Division of Refining, Philadelphia, May 1963.) Sludge from Pb gasoline storage tanks is normally disposed of by burial. Various other methods of disposal ie, roasting, chemical treatment, leaching, etc, have been studied and found to be only partially effective. Thermal treatment and weathering are the most effective substitutes. Heating sludge containing 0.012% TEL for 20 min at 200°C reduces the TEL content to 0.00001-0.00002% by weight. Spreading sludge in a 3-in layer on a ground or concrete surface and leaving it for 4 wk at temperatures >0° will reduce the TEL content to <0.002% by weight (20 ppm). It can then be treated as any non-hazardous waste. The limit of 20 ppm organic Pb was set by the Ethyl Corporation as being safe in the open air after the sludge has weathered. The disposal procedure developed, so that a uniform method would be followed, includes protection of personnel. In handling and spreading the sludge, special clothing as recommended for tank cleaning should be worn; masks will be required when there is no air movement and vapor can be detected by odor at face level.

3470 Demidov, V.I.: (UTILIZATION OF ION EXCHANGE RESINS FOR THE PURIFICATION OF WASTES FROM THE LEAD-ZINC INDUSTRY.) Ionoobmen. Sorbenty v Prom., Akad. Nauk SSSR, Inst. Fiz. Khim. 1963:160-6.
The wastes from Zn extraction plants (pH 6.5-8.5, containing up to 100 mg Zn/l and 1.0-1.5 mg Cu, Pb, and Cd/l) were filtered through 300 mm high columns of cation exchange resins (catexes) KU-2, SBS, and sulfonated coal in H form (filtration rate 5.5, 8.3, and 11.0 m/hr; total dynamic exchange capacity 8-9, 3-4, and 2.5-3.5% Zn/dry catex weight, respectively). The Pb wastes from Zn concentration, containing 40-60 mg Pb/l with pH 11-12, were fully purified on anex EDE-10P or catex KU-2, which had a total capacity of 32-37 and 13-14% Pb/dry ionex, respectively. Pb was recovered with 1-3% HCl. (From Chemical Abstracts 60:6612, 1964)

3471 English, J.N., McDermott, G.N., and Henderson, C. (R.A. Taft Sanitary Eng. Center, Cincinnati, O.): POLLUTIONAL EFFECTS OF OUTBOARD MOTOR EXHAUST - LABORATORY STUDIES. Journal Water Pollution Control Federation 35:923-31, 1963.
A preliminary study was made of the pollution contributed by outboard motors by operating motors (a 5.4-hp 1939-49 and a 10-hp 1960 model) in small tanks of water. The fuel mixture consisted of regular Pb motor gasoline and an outboard motor lubricating oil. Fish toxicity tests and tainting of fish flesh were included in the study. Based on the results of this study, an estimate was made of the total quantity of fuel constituents contributed to water by such exhausts in the US in 1959: 3-13 million gal gasoline, 7-15 million gal oil, and 0.2-0.7 million lb Pb. The average concentration of pollutants in receiving water at assumed extreme-critical situation, as tabulated, is shown, in mg/l: nonvolatile oil, 1.7; volatile oil, 0.94; Pb, 0.0087; phenols, 0.01; chemical oxygen demand, 7.1. The recommended quantity of water dilution/gal fuel consumed for the protection of aquatic life is estimated as 10 times the quantity that produces fish mortality, or ~19,000 gal. A dilution of 16,000 gal water/gal fuel consumed may have a significant toxic effect on fish life. The authors conclude that the quantity of water diluting the exhausts is of major significance. Unusually low water volume per unit of fuel consumed will result in severe pollution from outboard motor operation alone.

3472 Hoather, R.C., and Rackham, R.F. (Counties Public Health Lab., London, England): SOME OBSERVATIONS ON RADON IN WATERS AND ITS REMOVAL BY AERATION. Journal of the Institution of Water Engineers 17:13-22 (Feb.), 1963.
Five samples of ground water from Devon, Cornwall, and Palestine were analyzed for Ra, Rn, RaD (^{210}Pb), the total content of saline constituents, and K. The Rn content of the water (2.7-15 μCi/l) was sufficiently high to require its removal. ^{210}Pb content was 1-<6 μμCi. Since the planned treatment by aeration was unlikely to reduce the Rn content of the water sufficiently from its natural figure of 15 μCi/l, experiments were carried out using a sintered glass disk from which air was made to rise through the water in small bubbles. Partial removal (~75% after 4 hr) was obtained with an air/water ratio of 2/1. If circumstances permit storage of the water for a sufficient length of time for radioactive decay, depending on the Rn content and the half life of 3.8 days, treatment by aeration would be unnecessary. If the air were frequently to stagnate

around the aeration works it appears that any population in the area considered would be likely to be exposed to a long-term hazard. For any very large-scale aeration treatment, the plant should, therefore, be situated in an isolated position.

3473 Kondrashina, A.M., and Yakovleva, Z.M.: (STRENGTHENING OF MINERAL ORE TAILING DUMPS AT THE TEKELI CONCENTRATOR.) Tsvetn. Metal. 36, No. 10:77-80, 1963.

Only freshly produced tailings were almost sterile. Those 1 yr and older were inhabited by microflora, showing that the tailings had low toxicity. Marked leaching of Zn and some migration of Pb occurred in the soil under growing plants. Biological growth would strengthen the tailings and prepare the contents for additional extraction of metals. (From Chemical Abstracts 60:9007, 1964)

3474 Scott, H.M. (Lusaka, Northern Rhodesia): LEAD POISONING IN SMALL ANIMALS. Veterinary Record 75:830-3 (Aug. 17), 1963.

An outbreak of 28 cases of Pb poisoning in dogs and cats at Broken Hill Mine Township, Northern Rhodesia, is described. Abdominal signs included restlessness, pains, vomiting, diarrhea; nervous signs consisted of symptoms of anxiety, hyperexcitability, fear, hysteria, continuous barking and convulsions. The onset of symptoms was usually very sudden; in cats only nervous signs were observed. Blood slides showed no basophilic stippling. The minerals mined at Broken Hill are Pb and Zn; it was suspected that the animals were ingesting Pb. Treatment with CaEDTA (1 g daily for 7 days for a dog weighing 30 lb) was very successful. Pb determinations in tissues from dogs and cats that had died of suspected Pb poisoning gave the following results, Pb in ppm: blood, 1.3-1.5; kidney, 2.5-3.7; bone, 5.5-42; liver, 2.5-9.2; stomach contents, 1.5-2.1. Since there was a possibility that the Pb hazard may involve also human beings, Pb assays were made of the soil and the vegetation in the area. The Pb content of soil from the yard of a house at the surface, and 3, 6 and 12 in deep, respectively, was, g/kg soil, 2.5, 3.0, 1.6, 2.8. Four samples of smelter ash from drives in the housing area contained, in g/kg, 0.20, 42.6, 0.10, 0.20, respectively. Other assays taken at different locations gave the following data, in g/kg: soil, traces to 5.9; unwashed grass, 0.09-0.672; grass ash, 0.04-6.65; water, mg/l, 0.1-25.4.

3475 Shacklette, H.T. (U.S. Geol. Survey, Denver, Colo.): VARIATION IN ELEMENT CONTENT OF AMERICAN ELM TISSUE WITH A PRONOUNCED CHANGE IN THE CHEMICAL NATURE OF THE SOIL. US Geological Survey Professional Papers: 475-C, Article 86:C105-6, 1963.

The element content was studied in the tissues of 2 American elm trees, one growing in normal soil, the other in a location where its base was flooded by galena and sphalerite tailings from an ore mill in Wisconsin. Elements determined included Ca, K, P, Cu, Pb and Zn. The Pb content of tailing fines and of soil near normal trees was 0.02 and 0.015% of dry weight, respectively. The differences in the Pb (and Cu) content of the ash had no clear-cut relation to the increased amounts found in soil. As the higher amounts of Zn and P in soil resulted in an increase of these elements only in wood formed subsequently, chemical analysis of tree rings may be a useful method of determining the year when the trees were exposed to increased amounts in soil; also, in geochemical exploration, for determining if a chemical anomaly in the soil is caused naturally or by man-made contamination, by determining the date of this increase, it may be possible to determine the cause.

3476 Shumaev, V.D., Nevskaya, A.I., Shanina, T.N., Dmitrieva, V.P., Volkov, D.G., and Chigrina, T.A. (Kazakh Inst. Epidemiol., Microbiol., Hyg., and Rep. Sanit.-Epidemiol. Station): Stochnye vody leninogorskogo polimetallicheskogo combinata i ikh vliyanie na otkrytye vodoemy goroda. (EFFLUENTS FROM THE LENINOGORSK POLYMETALLURGICAL COMBINE AND THEIR EFFECT ON OPEN WATER RESERVOIRS.) Gigiena i Sanitariya 28:69-73 (July), 1963.

In 1959-61 an investigation was made of the effluents from beneficiation, Pb, hydrometallurgic, chemical and mine works, and their effect on water quality. The following were determined before and after settling or treatment for the above factories: odor; its disappearance with dilution; suspended solids; pH; residue; oxidizability; total Fe; F; Pb; Cu; Zn. Of the chemical substances, Fe ranged from traces to 150 ml/l; F was found only in the discharge from the beneficiation works (0.96 and 1.1 mg/l); Pb ranged from 0-9.7; Cu, from 0.03-8.22; Zn, from 0.08-400.2. The concentrations of the above ions and several flotation reagents were also determined above and below discharge area in the Filippovka River, Tishinsko reservoir and Ulba River. The authors conclude that since in the discharge waters of the nonferrous industry >20 different elements were found, for 14 of which maximum allowable concentrations have not yet been set, such limits should be determined as soon as possible.

3477 Skrylev, L.D., and Mokrushin, S.G.: (EXTRACTION OF HEAVY METAL IONS FROM INDUSTRIAL WASTE WATERS.) Zh. Prikl. Khim. 36: 454-5, 1963.

A method was developed for large scale extraction of heavy metal ions from industrial waste waters by precipitation with $K_4Fe(CN)_6$, trapping the solid phase in a foam formed by blowing air through the suspension to which gelatin or animal glue was added as a foam former. The foam with the entrapped precipitated heavy ferrocyanides was then separated from the bulk of the solution in a specially designed column. A mixture of the ferrocyanides of Cu, Mn, Ca, Ni, Zn, Th, Hg, Cd, Ag, U, and normal $Pb_2Fe(CN)_6$ were separated in 5-10 min at 18°. Increasing the temperature increased the rate of extraction. Surface-active substances can be simultaneously removed by this method. (From Chemical Abstracts 58:11094, 1963)

3478 Stones, T. (Sewage Dept., Salford, England): A STUDY OF THE KINETICS OF THE BIOCHEMICAL OXIDATION OF SETTLED DOMESTIC SEWAGE. J. Inst. Sew. Purif., 1963, Pt.

3:285-90.

Experiments on the kinetics of biochemical oxidation of settled domestic sewage have shown that the presence of toxic metal ions including Pb not only causes an initial lag period until the microorganisms become adapted, but also causes a marked reduction in the total BOD, and under these conditions, therefore, the amount of O_2 absorbed in a given period indicates the metabolic activity of the microorganisms rather than the amount of oxidizable matter present. In the absence of toxic matter, however, the rate of biochemical oxidation appears to be controlled by the dissolved O_2 concentration and the residual BOD, and the process then conforms closely to a 2nd order reaction until the secondary effect of nitrification becomes significant. (From Water Pollution Abstracts 37:Abstr. No. 1318, 1964)

3479 Zdybiewska, M., and Strutynska, B.: (EFFECT OF SOME CHEMICAL SUBSTANCES ON THE INDEXES OF CONTAMINATION OF SEWAGE RESERVOIRS.) Przemysl Chem. 42, No. 4-5: 250-3, 1963.

Increasing quantities of Pb caused a decrease in O consumption and chemical and biochemical O demand and showed toxic effects on bacteria. (From Chemical Abstracts 59:7234, 1963)

1964

3480 Jones, J.R.E. (Univ. College Wales, Aberystwyth): FISH AND RIVER POLLUTION. London, Butterworths, 1964, 200 pp.

Chapter 5 (pp 53-65; 29 references) deals with the coagulation film anoxia theory regarding Pb, Zn, and Cu. After reviewing the literature in relation to pollution of rivers by Pb, Zn, and other heavy metals through industrial and mining wastes and in relation to toxicity experiments on fish, the author discusses more recent research on the toxicity of Pb, Zn, and Cu to fish: (1) toxicity of a solution as influenced by the degree of hardness of water; (2) reexamination of the coagulation film anoxia theory; (3) toxicity of solutions containing both Cu and Zn.

In experiments on rainbow trout with Pb nitrate, it was found that with water of 14 ppm hardness (as $CaCO_3$), all the Pb added remained in solution; some precipitation occurred with water of 27 ppm hardness while in that of 53 ppm hardness most of the Pb was precipitated with not >1.6 ppm remaining in solution. The precipitated Pb appeared to be nontoxic. Solutions made up with soft water were toxic to the rainbow trout down to a concentration of <1 ppm. It is possible that the exact nature of the toxic action of heavy metal ions on fish may depend on the nature and quantity of their gill secretions, the heavier the gill secretions the more protection. Experiments with fish in this respect are reviewed, with evidence suggesting that the toxic action of the heavy metal salts (including Pb) produces damage to the gill tissues, the formation of a film of coagulated mucus, or both, bringing about death by asphyxiation. Of the 3 metals, Cu is the most toxic to trout; the lethal limits of Pb and Zn are very similar for water of the same degree of hardness. Synergism and antagonism are included in the discussion. The combination of Cu and Zn is synergistic; Pb, however, reduces the toxicity of Cu, ie, it is antagonistic.

Chapter 6 (The Metals as Salts, pp 68-82; 31 references) also deals in part with the reactions of fish to Pb, Zn, and Cu. Salts of Pb, Zn, Cu, hydrolyze to some extent, but there is little evidence to suggest that the acidity of the solutions resulting from this hydrolysis is sufficiently high to be a lethal factor except, perhaps, at very high concentrations. The lethal limits of the metal salts (including Pb chloride and nitrate) are shown in a table. The capacity of fish to detect and avoid toxic concentrations of metallic salts, including Pb, varies very much with different species. Experiments with 4 heavy metals showed the ability of the stickleback to detect and avoid them in the order of Pb, Hg, Zn, and Cu.

3481 Lamb, R. (Simon-Carves Ltd., Stockport, Chesh., England): A SUGGESTED MEASURE OF TOXICITY DUE TO METALS IN INDUSTRIAL EFFLUENTS, SEWAGE AND RIVER WATER. International Journal of Air and Water Pollution 8:243-9 (Mar.-Apr.), 1964.

Although the toxicity of metals, at certain concentrations, to bacteriologic treatment processes of wastes is well known, there is no simple test for the quantitative measure of this toxicity. Since pyridyl azo-resorcinol (PAR) gives a reddish-brown color reaction with a number of metals (including Pb), the author suggests that the PAR or PAR minus iron (PAR-I) values be recognized as such a measure.

In the development of the method, the decision to base the calibration on Fe was made because Fe is not regarded as a toxic metal and is not subject to very strict control. The optimum pH for the measurement of optical density was found to be 9 (using metanil yellow as reagent), and the wavelength, 500 mμ. After construction of calibration graphs based on Fe, optical density/concentration graphs of other metals were then constructed and their PAR factor determined. This factor is that which the actual concentration of the metal, expressed in μg/ml (or ppm), has to be multiplied by to obtain the same results as would be obtained using PAR and the Fe calibration curve. The application of this method is illustrated in the analysis of a plating shop effluent before and after treatment.

3482 Malina, J.F., Jr. (Univ. Texas, Austin): TOXICITY OF PETROCHEMICALS IN THE AQUATIC ENVIRONMENT. Water and Sewage Works 111: 456-60 (Oct.), 1964.

The discussion of the potential hazards of organic chemicals which are increasing in many water courses as a result of the growing industrial, agricultural, and domestic application of petrochemical products (including TEL) covers the potential toxicity to man, and toxicity to aquatic organisms. Included is a tabulation of the results of toxicity bioassay on fish and aquatic organisms reported by numerous investigators of many compounds including TEL, for which the 96-hr median tolerance limit, that is the concentration of material at which 50% of bluegills can survive for 96 hr, was found to be 0.20 mg/l. The author concludes that there is no assurance that trace concentrations of complex organic compounds have no deleterious effects on the water and on the aquatic organisms. The available information on this subject is limited and deals primarily with the acute effects of chemicals on the biological population in the hydro-environment. Additional information which deals with the physiological effects of trace concentrations of these chemical compounds which have been consumed by man over long durations of time is required.

3483 Shanin, T.N.: SANITARY-HYGIENIC CHARACTERISTICS OF INDUSTRIAL SEWAGE FROM NON-FERROUS METALLURGY ENTERPRISES IN SOUTHERN KAZAKHSTAN AND THEIR EFFECT ON BODIES OF WATER. Materialy 6-oi (Shestoi) Itog. Nauchn.-Prakt. Konf. Kazakhsk. Inst. Epidemiol., Mikrobiol. i Gigieny, Alma-Ata 1964:141-3.

Sewage from the Chimkent Pb factory had the following characteristics, in mg/l: solid residue 500, Pb 1.6, Cu 0.29, Zn 0.14, As 1.0, Cd 0.17, Mo 0.04, oxidizability 25. After entrance of the sewage into an irrigation canal, the canal water showed Pb 0.9, Cu 0.15, Cd 0.17, Zn 0.6, As 1.0. Sewage from 3 ore-beneficiating factories, before and after settling in a tailings reservoir, respectively, contained, in mg/l: solid residue 837-1672, 744-1268; suspended solids 20,044-88,564, 13.7-90; total Fe 0.38-0.5, 0.24-0.54; Pb 0.02-0.06, 0.01-0.12; Cu 0.42-6.0, 0.42-3.4; Zn 2.81-6.0, 1.0-4.0; cyanide 0.022-0.045, 0.016-0.029; phenol 4.64-8.5, 0.4-4.32; xanthates 0.5-200, 0.3-25; S 0.02, 0; oxidizability 5.91-12.40, 8.0-24.8; clearness, in cm, 0, 2.5-15. (From Ref. Zh., Khim. 1965:Abstr. No. 151261; Chemical Abstracts 64:3195, 1966)

3484 Tsivoglou, E.C., and O'Connell, R.L. (R.A. Taft Sanit. Eng. Center, Cincinnati, O.): NATURE, VOLUME, AND ACTIVITY OF URANIUM MILL WASTES. In Symposium on Radiological Health and Safety in Mining and Milling of Nuclear Materials, International Atomic Energy Agency, Vienna, 1963. Proceedings 2:101-22, 1964.

In-plant surveys were made of U mill processes to determine the qualitative and quantitative nature of the liquid and solid wastes. Liquid wastes contained ^{226}Ra and ^{210}Pb at concentrations potentially hazardous to downstream water users. Dissolved Th and U were usually not present in significantly high concentrations. Most of the activity in the ore is made into solid waste, which cannot be safely discharged to surface waters. Streams may be chemically polluted by compounds leached from the ore or added in the processing. The toxicity of mill wastes to aquatic organisms, particularly the organic raffinate from solvent extraction was shown by visual observation of the stream and bioassays. Waste neutralization significantly decreases dissolved ^{226}Ra, and treatment with Ba compounds decreases it further. Final disposal of liquid waste by evaporation and seepage minimizes the amount discharged to surface waters, and injection into underground formations was successfully carried out. Satisfactory methods for the permanent retention of the highly active solids remain to be developed.

3485 Wilson, D.O., and Cline, J.F. (General Electric Co., Hanford Atomic Products Operation, Richland, Wash.): REMOVAL OF Pu^{239}, W^{185}, and Pb^{210} FROM SOIL BY PLANTS AND ION EXTRACTION SOLUTIONS. US Atomic Energy Commission Document No. HW-80500, 1964, pp. 187-90.

The uptake of ^{210}Pb, ^{185}W and ^{239}Pu by plants and the interaction of these elements with soil and chelating agents was studied. A modified Neubauer technique was used to study the uptake of ^{210}Pb by barley. The Pb isotope was added to the soil as Pb chloride, at a level calculated to give 0.1 μCi/g dry soil at the time of harvest. L/S ratios ranged from 0.002-0.005 for ^{210}Pb. (From Nuclear Science Abstracts 18:Abstr. No. 41042, 1964)

VII. LEGAL ASPECTS

1950

3486 Great Britain, Statutory Instruments 1950, No. 65 - Factories: THE POTTERY (HEALTH AND WELFARE) SPECIAL REGULATIONS. London, H.M. Stationery Office, 1950, 26 pp.
The regulations prepared in 1950 came into operation on April 2, 1950. They apply to the manufacture and decoration of pottery, the calcining, crushing, grinding or sieving of flint or quartz, the mixing of flint or quartz with other material in the preparation of a pottery body, and the manufacture of transfers, frits or glazes for use with pottery. The employment of women and young children is prohibited in 11 groups of processes, including some which involve the handling of Pb compounds, and others where there is a silica-dust hazard. Other restrictions apply to loading, carrying, and lifting by women or young persons. Young persons may not work as wheel turners at tile presses, or other work involving Pb or colors. Persons <16 yr are not to be employed on certain scheduled processes when carried out in factories other than leadless glaze factories, and girls <16 may not work as lathe treaders. All persons employed on the scheduled processes concerned with Pb and colors must be medically examined each month, and health registers are required. The Appointed Doctor may suspend persons from work on these processes. For specified operations prescribed protective clothing must be provided, and must be worn. Outdoor clothing must be kept in accommodation to be provided outside any room in which a scheduled or dusty process is carried on. Further regulations related to the provision of washing facilities with hot and cold water, soap, towels and nail brushes, the provision of mess-rooms, the washing of hands before taking food, drink or tobacco, and the prohibition of food and drink in workrooms where scheduled processes are carried on. Each workroom must be ventilated without direct draughts on workers. Drying stoves must generally be used for the drying of ware by means of heat. The temperature of any workroom must not be >75° F., unless the external temperature exceeds 65° F., and then it may not exceed the external temperature by more than 10° F. In specified shops the temperature must not be <55° F. after the first hr of work. For a variety of processes efficient exhaust draught is required, and the work must be done under a suitable hood whenever possible. Various appliances for handling dry materials must be enclosed and have exhaust draught. Dust removed by exhaust plants must not escape into a workroom, and the air discharged from such plants must be discharged into the open air. There are also provisions as to the construction, maintenance and cleaning of floors and work-benches, the preparation and storage of clay dust, the control and spacing of tile presses, the use of raw and Pb compounds, glazing, color-blowing, hydrofluoric acid, lithographic transfer making, and separation of processes. Among provisions as to the general suppression of dust is a requirement that the cleaning of potters' shops shall only be done by adult males, and with vacuum-cleaning apparatus. Respirators are to be provided for use where specified. (From Bulletin of Hygiene 25:474-5, 1950)

3487 Great Britain Ministry of Labour and National Service. Factories Acts, 1937 & 1948. REVISION OF REGULATIONS FOR SHIPBUILDING AND SHIP-REPAIRING. Preliminary draft of new code. London, H.M. Stationery Office, 1950, 27 pp.
The title of this Draft Statutory Instrument is The Shipbuilding and Ship-Repairing Special Regulations, 1950. The Regulations deal with safe access to ships, safety ladders and staging, and with fencing and other precautions against falls of persons, materials and articles. They deal with machinery and plant used in raising and lowering loads in shipyards. There are required precautions against asphyxiation, injurious fumes, or explosions, including provisions concerning the ventilation of enclosed or confined spaces. Other miscellaneous safety provisions deal with fencing of machinery, air receivers, lighting, work in boilers, etc, hatch beams, and jumped-up bolts. Protective wear for the workers includes adequate protection for the hands, goggles, helmets or other shields for the protection of those using cutting or welding apparatus, eye protection for other processes and respirators for specified tasks. Miscellaneous health and welfare provisions include the prohibition of the employment of young persons on the handling of asbestos or containers which have been used for asbestos. Pb paint may not be sprayed inside a vessel. There are detailed first-aid requirements. Finally, there are requirements concerning the training of young persons, and safety supervision. (From Bulletin of Hygiene 26:69, 1951)

3488 Greener v. E.I. du Pont de Nemours and Co.: LEAD POISONING - COVERAGE OF ACT - EVIDENCE OF OCCURRENCE TO PRIOR TO EFFECTIVE DATE OF LAW. Tennessee Supreme Court, March 17, 1950.
"Suit was brought to recover compensation for disability. The case was once previously reversed and remanded by this court on the sufficiency of the petition. Upon a trial on the merits, the case was dismissed by the lower court

upon the defendant's motion. Evidence was adduced at the trial to show the petitioner suffered from Pb poisoning, symptoms thereof having been discovered as early as November, 1945, and prior to the effective date, March 12, 1947, of the amendment to the Act covering such claims. The Act, as so amended, outlawed occupational diseases existing prior thereto. Where there is material evidence, as in this case, to support the finding of the trial judge, we do not look to the preponderance of the evidence. The judgment of the lower court is, therefore, affirmed." (From Industrial Hygiene Digest 14:Abstr. No. 664 (June), 1950.

3489 Gulf Casualty Co. v. Hughes: ACCIDENTAL INJURY - INHALATION OF PAINT FUMES - LEAD POISONING, NEPHRITIS HYPOTHESIS - GOOD CAUSE FOR LATE FILING - INABILITY TO EMPLOY COUNCIL. Texas Court of Civil Appeals, 9th Supreme Judicial District, Beaumont, No. 4683, Apr. 27, 1950. Rehearing denied, May 11, 1950.

"Inability to employ counsel to take the case may be found to constitute good cause for delay in filing a claim. In this case, the evidence that nephritis caused the death did not require that judgment be rendered in favor of the carrier. Although the widow's case was not wholly based on a hypothesis that the decedent died of Pb poisoning (so that failure to prove exposure to Pb was not fatal to the claimant) and although there was some evidence that inhalation of paint fumes was connected with the illness, the lack of testimony as to the effect of the fumes on the human body and the failure to show an injury in the course of employment required that the case be remanded for new trial." (From Industrial Hygiene Digest 15: Abstr. No. 9, 1951)

1951

3490 Foreman v. Dorsey Trailers, Inc.: LEAD POISONING - PAINTER - SAFE PLACE TO WORK - INSUFFICIENT VENTILATION - FELLOW SERVANT. Alabama Supreme Court No. 622, Oct. 11, 1951.

"An employer owes an employee the duty of exercising due care to provide a reasonably safe place in which the employee may perform his duties. This is a common law duty, not dependent upon the Employers' Liability Act. The duty is not delegable and the fellow servant doctrine does not apply. Knowledge by the employee that certain work is harmful to him is not good defense to a complaint charging the employer with wanton injury of an employee. It is a good defense to a count based on negligence, but not to one based on wantonness. A painter used a spray gun in painting truck trailers produced by his employer. It was alleged that the employer wantonly injured the employee by causing him to work in a room which was not properly ventilated.

For overruling the demurrer to the plea by the employer of the claimant's knowledge of the danger, the judgment is reversed and the nonsuit set aside and the cause restored for further proceedings." (From Industrial Hygiene Digest 16: Abstr. No. 264 (Mar.), 1952.

3491 France, Ministry of Public Works and Transportation: Matières dangereuses. Plomb tétraéthyle et mélanges. (REGULATIONS GOVERNING TRANSPORTATION OF DANGEROUS MATERIALS: TETRAETHYL LEAD AND MIXTURES.) Archives des Maladies Professionnelles de Médecine du Travail et de Sécurité Sociale 12:712-3, 1951.

The essentials of the modifications of regulations adopted in April 1945 are as follows: (1) Transport of unstable TEL is prohibited. (2) Oils and fuels containing a maximum of 0.35 wt % TEL are subject to the same conditions as ordinary oils and fuels. (3) Containers of TEL and its mixtures and those which had contained these products and were not disinfected must be labeled as to nature of product, name, address and telephone number of sender. (4) Containers will be considered as contaminated unless they have been completely neutralized and labeled "decontaminated." (5) The shipper must deposit with his shipping declaration a portable box with handle and a box of decontaminant, both labeled according to regulations. The box must contain 3 samples of the notice approved by the minister, showing what to do in case of accident and also 2 pairs of rubber gloves, 1 gas mask with a case containing 400 cc active carbon, and placards carrying the inscription "Danger,TEL fluid. Do not approach without mask." (6) Containers of these products must be loaded into covered cars. (7) No vehicle contaminated by TEL is to be put back into service unless it has been decontaminated under the direction of a competent person; the wooden parts must be removed, burned and replaced.

3492 Maxwell Motor Corp. v. Winter: LEAD POISONING - AFTER AMENDMENT. (1928) 163 N.E. 198.

"Where a painter contracted Pb poisoning, it was held that he had the right to elect within 90 days from the time he had become disabled to sue for damages for violation of a safety requirement, under Section 1465-76, permitting such election." (From Industrial Hygiene Digest 15: Abstr. No. 1083 (Oct.), 1951.

3493 Smith v. Federated Metals Corp.: LEAD POISONING - TIME FOR FILING CLAIM. (1939) 133 S.W. 2d 1112.

"It is held that the claim for compensation for Pb poisoning was filed within the required time. It was filed within 6 mo from the time that it became reasonably discoverable and apparent that a compensable disease had been contracted. Application for writ of certiorari to quash the opinion denied by the Missouri Supreme Court." (From Industrial Hygiene Digest 15:Abstr. No. 682 (July), 1951.

3494 Wesley v. Warth Paint and Hardware Co.: CHRONIC LEAD POISONING - PAINTER - MEDICAL TESTIMONY TO SUPPORT CLAIM. Florida Supreme Court, No. 21,702, Apr. 20, 1951.

"The court held that claimant, a painter, had submitted sufficient evidence to support his claim that his illness resulted from chronic Pb poisoning. The claimant had been in the employment of the defendant when he was forced to leave because of illness which responded to treatment for chronic Pb poisoning, a disease to which painters are susceptible." (From Industrial Hygiene Digest 15: Abstr. No. 548, 1951)

1952

3495 Frazier v. National Bearing Division: METAL SORTER - LEAD POISONING - CONFLICTING MEDICAL TESTIMONY - SUFFICIENCY OF EVIDENCE. Missouri Supreme Court, No. 42, 716, July 14, 1952.

"A metal sorter in a bearing works became incapacitated from a uremic and hypertensive cardiorenal ailment and subsequently died. His attending physician was of the opinion that a contributing cause of the employee's death was Pb poisoning contracted as a result of the employee's work conditions. A nurse of the plant, an industrial hygienist, and a physician, with 7 yr experience in matters dealing with Pb poisoning, all contributed testimony and interpretations of the decedent's medical record that tended to substantiate the employer's contention that the decedent was never unduly exposed to air containing Pb in excess of the nationally recognized limits of safety. The court ruled that there was substantial evidence to support the conviction that Pb poisoning was not a contributory cause of the employee's death." (From Industrial Hygiene Digest 16:Abstr. No. 1161 (Dec.), 1952.)

3496 U.S. Congress, House of Representatives: HEARINGS BEFORE THE HOUSE SELECT COMMITTEE TO INVESTIGATE THE USE OF CHEMICALS IN FOOD PRODUCTS. 81st, 2nd Session, 1950, 82nd, 1st and 2nd Sessions, 1951 and 1952. CREATED PURSUANT TO H.RES. 323, 74, and 447 (CONTINUING INVESTIGATION BEGUN UNDER H.RES. 323). J.J. Delaney, Chairman. Washington, D.C., Government Printing Office, 1951-2.

Pb arsenate was included among the pesticides at almost all hearings held in Washington, Chicago, Spokane, Seattle, San Francisco, Los Angeles, and New York City from Sept.1950-March 1952.

1953

3497 Australia, Victoria Government Gazette: LEAD WORKERS (MEDICAL EXAMINATION) REGULATIONS, 1953. EFFECTIVE 13 NOVEMBER 1953.

These regulations require a medical examination to be carried out within 4 wk of the commencement of employment in all occupations listed in the 1st schedule. This schedule also indicates the periodicity of medical examinations. Every medical examination is to include a general clinical examination, a blood examination and an examination of the urine. The 2nd schedule prescribes the manner in which the determination of the number of stippled red blood cells/million red cells must be carried out. The medical practitioner who carries out the examination must report to the chief health officer the result of the examination and certify whether or not the worker is suffering from Pb poisoning of a degree rendering him unfit for work in any occupation involving exposure to Pb. A warning notice setting forth the dangers of Pb poisoning, the measures of prevention and the occupations, trades or processes in which medical examinations are obligatory must be posted in the workplaces. The methods of treatment of paint and of glaze for the purpose of determining the percentage of Pb or compound of Pb present are described in 2 other schedules. (From Occupational Safety and Health 4, No. 3:82, 1954)

3498 Doane v. E.I. du Pont de Nemours and Co., Inc.: LEAD POISONING -- THIRD PARTY ACTION - LIABILITY OF CONTRACTOR ENGAGED IN THE PERFORMANCE OF THE EMPLOYER'S PRINCIPAL BUSINESS. U.S. Court of Appeals, Fourth Circuit No. 6734. Jan. 30, 1953. Appeal from the U.S. District Court for the Eastern District of Virginia.

"An action by 10 employees of an oil company for injuries sustained in the inhalation of Pb fumes in cleaning storage tanks, which was brought against the contractor who had agreed to furnish their employer with a skilled technician to direct their work, was properly dismissed since the employees could not maintain an action against a fellow employee or the contractor who was engaged in performing the employer's principal business. Affirmed." (From Industrial Hygiene Digest 18: Abstr. No. 707, 1954)

3499 Lederer, E. (Govtl. Ind. Med. Officer, Munich, Germany): Tabellen Über die durch Verordnungen, durch berufsgenossenschaftliche Krankheits-Verhütungsvorschriften oder sonstwie durch "Anweisungen" bzw. "Richtlinien" vorgeschriebenen ärztlichen Einstellungs-Überwachungsuntersuchungen in Betrieben. (TABLES OF PREPLACEMENT OR FOLLOW-UP EXAMINATIONS IN INDUSTRIES PRESCRIBED BY LAW, BY UNION HEALTH REGULATIONS OR OTHER "DIRECTIVES" OR "REGULATIONS.") Zentralblatt für Arbeitsmedizin und Arbeitsschutz 3:71-7, 1953.

Until the time of this publication, examinations of workers in hazardous occupations were performed in part by the governmental industrial medical officers or by duly authorized physicians or industrial physicians or by physicians appointed by the unions. The disadvantage of this was that no survey was available on the execution of the title examinations, or failure to execute them; therefore, it seemed necessary to the author to arrive at a better recording and uniformity. The existing regulations, etc, are segregated under (1) notification regarding regulations providing medical preplacement or follow-up examinations; (2) guide lines; (3) notices; the various industries or occupations, type and time of prescribed examinations, other provisions, and basis of regulations, are the column headings. Pb-exposure is involved in the following: storage battery plants; decorators and painters; Pb foundries; Pb paint and compounds manufacture; glass manufacture; demolition of ships; work with Pb-containing powders; potteries. Many of the regulations date back to the earliest part of this century.

1954

3500 France, Ministries of Industry and Commerce, and of Economic Affairs: Plomb Tétra-éthyle (Concentration maximum admise dans l'essence pour moteur). (LEAD TETRAETHYL (MAXIMUM ALLOWABLE CONCENTRATION IN MOTOR FUELS).) Archives des Maladies Professionnelles de Médecine du Travail et de Sécurité Sociale 15, No. 2:183, 1954.
Article 1. - Article 2 of the order of November 28, 1950, octane number is modified as follows: The octane number of gasoline, measured by C.F.R. Research method must be at least equal to 75. The maximum quantity of TEL that can be mixed with gasoline is fixed at 5/10,000. The Director of Fuels is charged with the execution of the present order, which shall be published in the official journal of the French Republic and shall be effective March 1, 1954.

3501 Great Britain Ministry of Food: REVISED RECOMMENDATIONS FOR LIMITS FOR LEAD IN FOOD. London, H.M. Stationery Office, 1954, 11 pp.
The report sets out the various ways in which food and drink may be contaminated with Pb. It also points out that Pb is stored in the body and under certain conditions this immobilized Pb may be released with toxic effects. This cumulative effect makes the control of Pb in foods of particular importance. Owing to practical considerations it was not possible to set out maximal amounts to apply generally to all foods. The limits for different classes of foods and beverages vary from 0.5-10 ppm, with 2 substances, food colorings and solid pectin, having still higher allowed limits. The reasons for these variations are discussed. The details are set out in the Report. It is recommended that the proposed limits should be made statutory but subject to periodical review. It is also proposed that the use of Pb piping for conveyance of beer, cider or other beverages, the use of Pb-containing material for packing or wrapping food, and the sale of domestic cooking equipment lined with Pb containing tin or pottery glaze should be controlled. (From Bulletin of Hygiene 30:55, 1955)

3502 Shafir, A.I.: LIMITS OF ALLOWABLE CONCENTRATIONS OF ATMOSPHERIC POLLUTANTS. A COLLECTION OF STUDIES UNDER THE EDITORSHIP OF PROFESSOR RYAZANOV, MOSCOW, MEDGIZ, 1952. A CRITICAL REVIEW. Gigiena i Sanitariya 1954, No. 2:59-60. In Ryazanov, V.A., ed.: Limits of Allowable Concentrations of Atmospheric Pollutants, Book 1 (Supplement), translated by B.S. Levine. Washington, U.S. Department of Commerce, Office of Technical Services, 1959, pp. 126-30.
The significance of the activity of the special committee created by the Chief State (Governmental) Sanitary Inspection administration of the USSR, under the chairmanship of Professor Ryazanov, is discussed. The first book, published in 1952, includes papers by the following authors who are members of the Committee: Beryushe on CS_2; Vinokurov and Kosourov on NO's; Vol'fson on CO; Gol'dberg on nontoxic dust; Gurinov on SO_2; Tomson on Pb; Ugryumova-Sapozhnikova on Cl. Included is also an article by Ryazanov, Alekseeva and Senderikhina on methodology.

1955

3503 American Standards Association: AMERICAN STANDARD SPECIFICATIONS TO MINIMIZE HAZARDS TO CHILDREN FROM RESIDUAL SURFACE COATING MATERIALS. Z66.1-1955.
A liquid coating material to be deemed suitable, from a health standpoint, for use on toys, furniture or for interior surface painting shall not contain Pb compounds of which the Pb content (calculated as Pb) is in excess of 1% of the total weight of the contained solids (including pigments and drier). Soluble compounds of Sb, As, Cd, Hg, Se, or Ba also should not be contained.
This standard was sponsored by the American Academy of Pediatrics.

3504 Bacon, P. (Ministry Labor Publ. Safety, Paris, France): Intoxication saturnine. (Mesures d'hygiène préventive). Approbation des termes des recommandations prévues pour les visites médicales effectuées en vertu du décret no 48-1901 du 11 décembre 1948, modifié par le décret no 55-849 du 23 juin 1955, concernant les mesures particulières d'hygiène applicables dans les établissements dont le personnel est exposé à l'intoxication saturnine. (LEAD POISONING. (PREVENTIVE MEASURES).) (APPROVAL OF RECOMMENDATIONS PROVIDED FOR MEDICAL VISITS EFFECTUATED BY VIRTUE OF ORDER NO. 48-1901 OF DECEMBER 11, 1948, MODIFIED BY ORDER NO. 55-849 OF JUNE 23, 1955, CONCERNING THE MEASURES APPLICABLE TO ESTABLISHMENTS WHOSE PERSONNEL IS EXPOSED TO LEAD INTOXICATION.) Archives des Maladies Professionnelles de Médecine du Travail et de Sécurité Sociale 16, No. 6:647-8, 1955.
It is recommended that in preemployment examinations for work involving exposure to Pb persons showing the following conditions be excluded: emunctory lesions: liver and kidneys; arterial hypertension; blood disorders; lesions of the central or peripheral nervous systems. In subsequent examinations, those should be excluded as being unfit because of presenting one or more of the above symptoms or those of Pb intoxication, ie, severe Pb colic or recurrences of it, persistent hyperazotemia or anemia, confirmed by the presence of basophilic stippled erythrocytes. Article 12 prescribes the scope of hematologic examination. Furthermore, it is recommended that 3 successive examinations be performed in case of doubt and that a decision should not be based on one single result. It is also advised that the medical examiner keep abreast of the studies of Pb intoxication, because of the importance of recognization of the degree of Pb intoxication.
The inability to work in a place where there is risk of Pb intoxication does not mean total inability for other work.

3505 Faure, E. (Ministry Labor, Safety, Paris, France): Intoxication saturnine. (Mesures d'hygiène préventive). Décret no. 55-849 du 23 juin 1955 modifiant le décret no. 48-1091 du 11 novembre 1948 portant règlement d'administration publique en ce qui concerne les mesures particulières d'hygiène applicables dans les établissements dont le personnel est exposé à l'intoxication saturnine. (LEAD POISONING. (PREVENTIVE MEASURES).) (ORDER NO. 55-849 of JUNE 23, 1955, MODIFYING ORDER NO. 48-1091 OF NOV. 11, 1948, BEARING ON PUBLIC ADMINISTRATION REGULATION CONCERNING MEASURES APPLICABLE PARTICULARLY TO ESTABLISHMENTS WHOSE PERSONNEL IS EXPOSED TO LEAD INTOXICATION.) Archives des Maladies Professionnelles de Médecine du Travail et de Sécurité Sociale 16, No. 6:646-7, 1955.

The Ministry of Labor and Public Safety approved a revision of articles 10-14 with more detailed articles 10-16. These specify that workmen should not be assigned to jobs in areas where Pb intoxication is possible without a medical approval, and that he should not be continued in the same occupation unless medical approval is obtained 1, then 3 mo after employment, and at least every 6 mo thereafter. The responsibilities of the management of the plant are also determined in the articles. The specifications for physical check-up are minutely described. These provide for stippled cell and erythrocyte counts and hemoglobin determinations at stated intervals. The physician for the industry has the right to perform complete hematologic tests and tests for blood urea upon his discretion. If the management is convinced of the efficacy of the preventive measures taken and if no cases of Pb poisoning have been reported in its plant, it may apply for exemption of the annual hematologic examinations to the regional Factory Inspector. An up-to-date register should be kept either for the entire plant or parts of it, in which the dates and durations of absence for occupational disease and name of the physician verifying the absence are recorded. In the plant a bulletin in a conspicuous place should show the name of the physician and location where physical examinations will take place, as well as information on the dangers of Pb toxication, the precautions to be taken for prevention, and the cure. These notices will have to be in accordance with those set by the Ministry of Public Safety.

3506 Raymond, V. (Paris, France): A propos de la prévention médicale du saturnisme. (MEDICAL PREVENTION OF LEAD POISONING.) Proceedings of the Society of Industrial Medicine and Hygiene. Archives des Maladies Professionnelles de Médecine du Travail et de Sécurité Sociale 16, No. 6:576-8, 1955.

The essential regulations adopted by the Ministry of Labor and Public Safety (of France) for the control of Pb poisoning in industry on June 23 and 24, 1955, are presented and discussed.

1956

3507 Association of Food and Drug Officials: LEAD IN DECORATIVE PAINT FOR CHILDREN'S TOYS AND FURNITURE. Association of Food and Drug Officials of the United States Quarterly Bulletin 20:36-7 (Jan.), 1956.

Considering 1.5 mg Pb/day as the maximum amount that may be ingested without harm and that a child with severe pica may ingest the paint from 12 in^2, this film should contain not >1.5 mg Pb. Since indoor paint contains a minimum of 60% pigment or 7.2 lb/gal, the amount of Pb necessary to deposit 1.5 mg/12 in^2 is equivalent to 7.2 and 10.8 g/gal (based on estimates of 400-600 ft^2 coverage), or Pb content of 0.22-0.3%. Therefore, 0.3% is suggested as the level below which decorative paints for children's toys and furniture can safely be labeled as nontoxic.

3508 Fournier, E.: Les ostéopathies professionnelles. (OCCUPATIONAL BONE DISEASES.) Bulletin Médical (Paris) 70, No. 3:92-3, 1956.

A concise review is given of the osseous, articular and musculo-tendinous affections which may occur as the consequence of occupational accidents or in the course of occupational diseases. A distinction is made between occupational risks for which in France compensation is obligatory (tetanus, brucellosis, carbon disulfide poisoning, Pb poisoning, injury from roentgen rays or radioactive isotopes, chromic acid poisoning, arsenical poisoning, compressed air lesions, pneumoconiosis) and those for which it is not (Cd and F poisoning, occupational rheumatism, vibration lesions). (From Excerpta Medica, Sect. 17, 3:Abstr. No. 1896, 1957)

1957

3509 American Academy of Pediatrics: Report of a Joint Meeting of the Committee on Accident Prevention and the Subcommittee on Poisoning: LEAD POISONING HAZARD FROM PAINT ON CHILDREN'S TOYS. Journal of the American Medical Association 165:1996 (Dec. 14), 1957.

See Abstract No. 3503

1958

3510 American Smelting and Refining Corporation v. Kaiser: OCCUPATIONAL DISEASE. LEAD POISONING. SUFFICIENCY OF MEDICAL EVIDENCE. Illinois Supreme Court No. 34, 596. March 20, 1958.

An employee of a smelting company was improperly denied compensation for disability occasioned by Pb poisoning on the basis that there were conflicting views among medical experts. The order of the commission was reversed. (From Industrial Hygiene Digest 22, Abstr. No. 561, 1958)

3511 Baltimore, City of: MAYOR D'ALESANDRO SIGNS LEAD PAINT LABELING ORDINANCE. Baltimore Health News 35:57-8 (Aug.), 1958.

The ordinance states as follows: No person, firm, or corporation shall have, keep, offer for sale, sell or give away in the City of Baltimore any paint containing >1% Pb, determined as metallic Pb based on the total nonvolatile content of the paint, unless it bears the following warning statement: "Warning - contains lead. Harmful if eaten. Do not apply on any interior surfaces of a dwelling, or of a place used for the care of children, or on window sills, toys, cribs, or other furniture." The ordinance shall take effect 30 days from the date of passage; it was approved on June 9, 1958.

3512 Barkley v. City of Alva: AGGRAVATION-LEAD POISONING-OCCUPATIONAL DISEASE-MEDICAL TESTIMONY-DEATH BENEFITS-SUFFICIENCY OF EVIDENCE. Oklahoma Supreme Court No. 37,703, March 18, 1958.

"An award to the widow of a deceased employee was properly granted where the medical testimony was sufficient to support the conclusion that Pb poisoning, contracted by the employee while at work, was a contributing or aggravating cause of his death. The employee's duties required him to work around Pb fumes and vapors which he inhaled. After being on the job for a long period of time he developed myeloma, and soon thereafter he died. Medical testimony established that his death was caused by the combined effects of the Pb poisoning and the myeloma. The court, in holding that Pb poisoning contracted while at work constituted an occupational disease and was thus compensable under the Workmen's Compensation Law, ruled that the evidence was sufficiently competent to support the award. Sustained." (From Industrial Hygiene Digest 22, Abstr. No. 682, 1958)

3513 Hanson, E.J.: THE STRUGGLE AGAINST LEAD POISON IN THE PAINTING TRADE. Brisbane, The Operative Painters' and Decorators' Union of Australia (Queensland Branch), 1958, 24 pp.

The object of this booklet is to celebrate the Queensland legislation of January 14, 1956 by which the manufacture, sale and use of paint containing white Pb is banned, and the use of other Pb-containing paints is strictly limited. It recounts the history of Pb poisoning in Queensland and the successful efforts of the Operative Painters' and Decorators' Union of Australia to achieve the abolition of white Pb. (From Occupational Safety and Health Abstracts 9:Abstr. No. 116, 1959)

1959

3514 Foulger, J.H. (E.I. du Pont de Nemours & Co., Inc., Wilmington, Del.): PRECAUTIONARY LABELING OF LEAD PRODUCTS. Industrial Medicine and Surgery 28:122-4; discussion, 124-5 (Mar.), 1959.

The author discusses the problems of labeling potentially harmful substances from the point of view of a physician who has been a member of the Federal Trade Commission since its inception. On the basis of his experience, he is in favor of the basic principles of labeling established by the Manufacturing Chemists' Association, which include information of the name of the compound (preferably true chemical name); words such as "danger" for very hazardous compounds, "warning" for less hazardous, "caution" for least hazardous, and "poison" for highly hazardous; route of hazard, and brief description of simple methods of avoiding the hazard, and simple remedial methods of treatment. He then discusses certain Pb compounds and the form (dust or solution, paint) in which they are distributed. Concerning paint hazards, Kehoe is cited as estimating that a child of 3 yr must ingest 7 g of paint (6 times that weight if it should contain 5% Pb) to get Pb poisoning, but the ASA Standard would require that the child eat 210 g (7 oz) to be poisoned. This he considers a safe standard.

3515 Schrenk, H.H. (Ind. Hyg. Foundation, Pittsburgh, Pa.): HYGIENIC LEAD STANDARDS. Industrial Medicine and Surgery 28:106-9; discussion 109-11 (Mar.), 1959.

The author points out that a figure of standards or limits has no significance per se but must be interpreted in terms of analytical, toxicological and medical data applicable to each individual compound. From this viewpoint standards relating to Pb concentration in air, urine, blood, water and paints are discussed.

3516 Waters, T.C. (Miles and Stockbridge, Baltimore, Md.): A LAWYER LOOKS AT LEAD. Industrial Medicine and Surgery 28:134-5; discussion 135-6, 1959.

In his discussion of legal matters, the author gives advice to the representatives of manufacturers and producers of Pb as to their liability to employees and to the consuming public. He points to the lack of uniformity in compensation statutes and the giving of medical testimony. As to liability to the consuming public, he points to the American Medical Association Committee on Toxicology recommendation that a uniform state Hazardous Substances Act be enacted, questioning whether there is to be a federal law or 49 state laws, or countless municipal ordinances and regulations.

1960

3517 Association of Food and Drug Officials, Committee on Sanitary Food Processing Equipment: C.A.S.A. ADVISORY REPORT 1959: RECOMMENDATIONS FOR THE DESIGN, CONSTRUCTION AND INSTALLATION OF BULK LIQUID FOOD EQUIPMENT IN PLANT. Association of Food and Drug Officials of the United States Quarterly Bulletin 24:42-5 (Jan.), 1960.

The recommendations made include the following paragraph: Pb must not be used within or adjacent to the product zone with the exception of its inclusion in dairy solder in an amount not to exceed 5% of Pb.

3518 Desoille, H. (France): Sur la mauvaise rédaction du paragraphe rélatif à l'anémie dans le tableau de réparation du saturnisme. (POOR WORDING OF PARAGRAPH RELATING TO ANEMIA IN THE LISTING OF COMPENSATIONS FOR LEAD POISONING.) Archives des Maladies Professionnelles de Médecine du Travail et de Sécurité Sociale 21:219-21 (Apr.-May), 1960.

An illness is considered to be an occupational disease requiring compensation if its symptomatology corresponds to one as defined in the law.

Since 1931 the listing contains a paragraph concerning anemia due to Pb poisoning. An anemia is defined to be subject to compensation if it is usually normochromic and aplastic. The author points out that the word "usually" should be omitted if compensation is limited to normochromic and aplastic anemias for it is ambiguous. He argues that if it is the intent of the law that only normochromic anemias be compensated, it should state so; if it is the anemia found in Pb poisoning, the wording should state "anemia confirmed by globular counts." In this connection, he cites one of his reports as having confirmed a severe anemia in a case of Pb exposure to be an aplastic type, accompanied by stippled cells; it was not normochromic. Therefore, if compensations are granted only for certain anemias, the presence of blood cells with basophil granulations should be included in the list of diseases eligible for compensation.

3519 Flaxman, N. (Chicago, Ill.): LEAD POISONING. Medical Trial Technique Quarterly 1960 Annual (Vol. 6):117-74.

Causes of chronic Pb poisoning including predisposing factors, hazardous occupations, industries using Pb or its compounds, other sources of possible Pb poisoning, toxicity of various Pb salts, routes of entry of Pb into the body and its distribution and elimination are discussed. Pathology, subjective (Pb colic) and objective symptoms (gum line, peripheral neuritis, palsy, cerebral encephalopathy and cardiovascular signs), laboratory tests (urinalysis, blood counts, Pb determination in urine, blood, feces, tissues and fluids), X-ray examination, diagnosis and differential diagnosis, prophylaxis, treatment and prognosis are reviewed. Medico-legal decisions in courts of 23 states are appended. (22 references)

3520 Goldstein, I., and Flaxman, N., ed.: MEDICAL TESTIMONY IN A LEAD POISONING CASE, INCLUDING THE DIRECT AND CROSS-EXAMINATIONS OF THE ATTENDING PHYSICIAN, PATHOLOGISTS, MORTICIAN, PERSONNEL DIRECTOR, AND BIOCHEMIST - A WORKMEN'S COMPENSATION CASE. Medical Trial Technique Quarterly 1960 Annual (Vol. 6):373-411.

The testimony applies to a fatal case of Pb who had the following signs and symptoms when seen by his physician (with experience of having treated 300 cases of Pb poisoning): pains in abdomen, cramp-like type, pain in limbs, headaches of varying severity, loss of memory, constipation, loss of appetite, nausea, history of vomiting, and arteriosclerosis starting shortly after beginning the 4-mo treatment period, which led to his death. Upon questioning, Pb was not determined in the urine, but albumin indicated the presence of nephritis. There was also hypertension. Treatment was by orally administered K iodide and Ca; also Ca iv and symptomatic treatment. The pathologist's testimony included microscopic examination of the liver, showing some cloudy swelling of cells, vacuolizations in the cytoplasm and faintly staining nuclear structures; aorta showed slight changes in the intima. Traces of Pb were found in the kidney and liver, using Lederer's test, estimated to be 1/10 or 1/100 mg in ~200 g tissue. Microscopic changes indicated a chronic interstitial nephritis. Further questioning brought out that Pb in normal urine, as reported by Kehoe, amounts to 0.0138 mg/l. Respondent's internist and pathologist gave testimony to the effect that it was not possible to conclude that deceased had Pb poisoning, since many people who are never exposed to Pb have Bright's disease. Biochemist's testimony questioned the method used for the identification of Pb in tissues, having found in kidneys and liver in Pb poisoning of from 10-20 mg/100 g.

3521 Great Britain Ministry of Labour (London, England): TOXIC SUBSTANCES IN FACTORY ATMOSPHERES. Safety, Health and Welfare New Series No. 8. Her Majesty's Stationery Office, March 1960. 12 pp.

MAC's in air are given for Pb as 0.2 and for Pb arsenate 0.15 mg/m^3.

3522 Hopkins, O.C., and Gullans, O.: NEW USPHS STANDARDS. Journal of American Water Works Association 52:1161-5 (Sept.), 1960.

A USPHS Advisory Committee for the revision of the 1946 Drinking Water Standards has proposed the reduction of the mandatory limit for Pb from 0.1 ppm to 0.05 ppm because: (1) Pb is a cumulative poison; (2) daily intake of Pb in excess of 0.6 mg may result in the accumulation of Pb in the body at rates that increase as the daily dose increases; (3) the amount of Pb intake from food sources is probably approaching an irreducible minimum, whereas exposure from other sources, such as the atmosphere is increasing; (4) it is believed Pb exposure should be reduced wherever possible.

3523 International Commission on Radiological Protection Committee II: REPORT OF ICRP COMMITTEE II ON PERMISSIBLE DOSE FOR INTERNAL RADIATION (1959). Health Physics 3:1-233 (June), 1960.

The contents of the report, aside from the introduction, are: Basic standards of maximum permissible internal exposure; maximum permissible values (MPC) for occupational exposure; calculation of MP exposure values; factors needed for calculation of MPC equations; appendix; references (43). These are followed by tables showing: MP body burdens and MP concentrations of radionuclides in air and in water for occupational exposure; radionuclides which do not reach equilibrium in the body within 50 yr; MPC of unidentified radionuclides in water for continuous occupational exposure; MPC of unidentified radionuclides in air for continuous occupational exposure; effective energies; effective energies for chains; element distribution in total body of the standard man (SM); elements in the body organs of SM; organs of SM; intake and excretion of the SM; particulates in respiratory tract of the SM; gastrointestinal tract of the SM; biological and related physical constants; index of report.

MPC's for ^{203}, ^{210} and ^{212}Pb are included; Pb distribution in total body of the SM is 1.1 x 10^{-4}% by weight and 0.08 g in 70-kg man. Pb in body organs are mainly those derived from Tipton's work (1960). Pb and isotopes are also included in the biological and related physical constants.

3524 Nesswetha, W. (Kelsterbach/Main, W. Germany): Uber die maximalen Arbeitsplatzkonzentrationen in der UdSSR. (MAXIMUM CONCENTRATIONS IN WORK PLACES IN THE USSR.) Zentralblatt für Arbeitsmedizin und Arbeitsschutz 10:112-4 (May), 1960.

In discussing the great discrepancy between the Russian and German MAC's of workroom air, with the lowest almost always on the Russian side, the reason advanced is the different approach to the problem. The Russians' medical theory is concentrated essentially on the response of the so-called higher nervous activity to the chronic exposure to minute concentrations of poisons, by use of very subtle physical, biochemical and psychophysical methods. The author wonders, however, the extent to which such experimental and clinical findings and proofs can be integrated into the W. European medical studies in order to become generally binding.

In conclusion, the author states that how far the industries have succeeded in realizing these surprisingly low values is not known, and that according to the literature, considerable disagreement between the norms and actuality may exist. "Aside from any polemics, a total evaluation could be at best only theoretical in the absence of own comparative experience." Among the tabulated substances for which MAC's have been set, that recommended in Germany for Pb is 0.15 mg/m^3, and that legally established in the USSR is 0.01 mg/m^3.

3525 Ryazanov, V.A. (State Med. Comm., USSR): NEW DATA ON MAXIMUM ALLOWABLE CONCENTRATIONS OF POLLUTANTS IN THE AIR IN THE USSR. Proc. Intern. Clean Air Conf., London 1959:175-6 (Publ. 1960).

The list includes the following tentative MAC values in air (mg/m^3): Pb, 0.0007; PbS, 0.0017. Criteria for setting maximum limits are discussed. (From Chemical Abstracts 55:13726, 1961)

3526 Van de Kamp, J.L.J. (Netherlands): Panorama storico delle malattie professionali protette dalla legislazione olandese. (HISTORICAL SURVEY OF OCCUPATIONAL DISEASES COVERED BY LEGISLATION IN THE NETHERLANDS.) Rivista degli Infortuni e delle Malattie Professionali 47, No. 6: 865-71, 1960.

The review begins with the Law of July 2, 1928, in which for the first time several occupational diseases were made equal to industrial accidents. The successive developments to the Law adopted in 1957 are described; these include interpretation and additional sources of diseases with expanding technology. Many ambiguities and inequalities in indemnity in the earlier years were due to lack of precision of exposure; eg, in the case of Pb poisoning, it was impossible to grant indemnity if the worker was employed in the manufacture of white Pb paint (basic Pb acetate). In time, the terminology was changed to the elements in question and their compounds, eg, "Pb and its compounds."

3527 Welsh, G.B., and Thomas, J.F. (Univ. California, Berkeley): SIGNIFICANCE OF CHEMICAL LIMITS IN USPHS DRINKING WATER STANDARDS. Journal American Water Works Association 52:289-300 (Mar.), 1960.

Maximum permissible limits for Pb in USPHS drinking water standards at their adoption in 1914 and at revisions in 1925, 1942 and 1946 were set at 0.1 ppm. Occurrence of Pb in natural waters and its effects on the organism are reviewed. The Pb contents of natural waters is normally very low except in the New England area. Samples from 37 systems throughout US showed a mean Pb content of 0.011 ppm. (45 references)

1961

3528 Brandt, A. (Inst. Ind. Hyg., Berlin-Lichtenberg, Germany): Die arbeitshygienischen Normen in der Deutschen Demokratischen Republik. (INDUSTRIAL HYGIENE STANDARDS IN THE GERMAN DEMOCRATIC REPUBLIC.) Proceedings of the International Symposium on Maximum Allowable Concentrations of Toxic Substances in Industry, Prague, Czechoslovakia, April, 1959. Pure and Applied Chemistry 3, No. 1-2:57-62, 1961.

The standards discussed for nontoxic dusts, for toxic gases, vapors and dusts, and for noise levels have not been firmly established, but are to serve as guides in industries. They are to be reviewed carefully in 2-3 yr. Among these, the MAC recommended for Pb in air is 0.2 mg/m^3; the biological "norm" for Pb in blood is 100 μg/100 ml.

3529 Horiuchi, K.: MAXIMUM ALLOWABLE CONCENTRATIONS OF TOXIC SUBSTANCES IN INDUSTRIAL ATMOSPHERES. Osaka City Medical Journal 7:63-93 (May), 1961. In Contributions from the Department of Preventive Medicine and Public Health, Osaka City University Medical School, Vol. 2, April 1959-March 1961, pp. 114-44.

This is a review of the history of the development of MAC's, presented at the Seminar on Occupational Health sponsored by WHO and ILO, held in Tokyo in Oct. 1960. The resolution of the International Symposium on Maximum Allowable Concentrations of Toxic Substances in Industry, adopted in Prague, in April 1959, is presented and discussed, as are the methods used to provide the information needed in order to propose a MAC, and the development of MAC's in biological material. The recommended values in USA established in 1960 and those in Russia in 1959 are shown in appendices. Much of the work performed by the author and his associates for establishing the MAC's in Japan are included in the review. (17 references)

3530 International Symposium on Maximum Allowable Concentrations of Toxic Substances in Industry: RESOLUTIONS OF THE INTERNATIONAL SYMPOSIUM ON MAXIMUM ALLOWABLE CONCENTRATIONS OF TOXIC SUBSTANCES IN INDUSTRY. Proceedings of the International Symposium on Maximum Allowable Concentrations of Toxic Substances in Industry, Prague, Czechoslovakia, April, 1959. Pure and Applied Chemistry 3, Nos. 1-2:8-16, 1961.

The articles of the Resolutions published in English and in French, are arranged under the following headings: (1) General principles relating to maximum allowable concentrations of toxic substances in industrial atmospheres; (2) methods used to provide the information needed in order to propose a MAC; (3) MAC's in biological material; (4) importance of suitable methods of physical or chemical analysis. These are signed by R. Truhaut, President of the Symposium.

3531 Kaloyanova-Simeonova, F. (Inst. Ind. Hyg. Occup. Dis., Sofia, Bulgaria): THE EFFECT OF INDIVIDUAL SENSITIVITY AND PHYSICAL EXERTION IN POISONING WITH SMALL DOSES OF TOXIC SUBSTANCES. Proceedings of the International Symposium on Maximum Allowable Concentrations of Toxic Substances in Industry, Prague, Czechoslovakia, April, 1959. Pure and Applied Chemistry 3, Nos. 1-2:83-4, 1961.

In the author's country, MAC is defined as that concentration which does not cause even the slightest symptoms of poisoning in the course of daily work over the entire working life, by considering individual sensitivities and factors affecting the resistance of the organism to these substances. In support of this attitude, she gives an example, based on animal experimentation, of individual variation to parathion; another deals with effect of physical exertion on resistance to small, near-threshold doses of TEL in rats. Small, repeated doses in the group which was exhausted by swimming, produced a more rapid intensification of the process of inhibition of conditioned reflexes, and the time required for the conditioned reflex to die down was shortened. Rats trained to swim showed disturbances of the conditioned reflex activity after a much longer time. This shows that exertion which results in training gives a higher resistance, while exhaustion lowers it.

3532 Kettner, H. (Berlin, Germany): Sowjetische MAK-Werte (Maximale Arbeitsplatz-Konzentrationen) für das Jahr 1960. (SOVIET MAC VALUES (MAXIMUM ALLOWABLE CONCENTRATIONS FOR THE WORKROOM) FOR THE YEAR 1960.) Zentralblatt für Arbeitsmedizin und Arbeitsschutz 11:63-5 (Mar.), 1961.

The industrial MAC values in air for numerous substances, published in the USSR in 1960, are discussed and compared with those established by the American Conference of Governmental Industrial Hygienists in 1959. The values are set for gases and vapors on the one hand and dusts and aerosols on the other; the previous division of poisonous and nonpoisonous has been abandoned. The USSR value for TEL is 0.005 mg/m^3; for Pb with its inorganic compounds, 0.01 mg. A table of general MAC values in community air gives 0.0007 and 0.0017 mg/m^3 for Pb and Pb sulfide, respectively.

3533 Parmeggiani, L. (Univ. Milan, Italy): Les orientations prédominantes en Italie, en matière de concentrations maximales tolérables pour les toxiques industrielles. (THE PRINCIPAL DIRECTIONS IN ITALY CONCERNING MAXIMUM TOLERABLE CONCENTRATIONS FOR INDUSTRIAL POISONS.) Proceedings of the International Symposium on Maximum Allowable Concentrations of Toxic Substances in Industry, Prague, Czechoslovakia, April, 1959. Pure and Applied Chemistry 3, Nos. 1-3:29-32, 1961.

In view of recent interest in Italy in MAC's for toxic substances, the author submitted a questionnaire to university institutes, organizations concerned with health surveillance, industrial health services, etc, for their opinion on the matter. The following definition, based on that of the American Conference of Governmental Industrial Hygienists in 1956, was adopted: the highest average concentration of a substance in the work atmosphere that can be absorbed without damage to the health of people working 8 hr/day, 6 days/wk throughout their working life. For certain substances, 2 values have to be set, depending on the form in which they exist, or are subject to absorption other than by inhalation, such as TEL and others that can be absorbed through the skin as well. The author discusses the principles and conditions for the values adopted, and closes by saying that it is the aim in Italy to maintain the MAC's at a practical level that could be attained even by the employer who has no industrial hygienist. The MAC's already constitute an instrument of prevention for the improvement of working conditions. If international agreement could be reached as to values and their interpretation, their usefulness would be considerably augmented. A bibliography of selected articles, applying to a number of substances, including Pb, by Italian authors is appended.

3534 U.S. Public Health Service: DRINKING WATER STANDARDS, 1961. Journal American Water Works Association 53:935-45 (Aug) 1961.

In a report of the Advisory Committee on Revision of USPHS 1946 Drinking Water Standards the following standards, as approved by the Secretary of Health, Education and Welfare and published in the Federal Register, are given for Pb: Pb in excess of 0.05 mg/l shall constitute grounds for rejection of the supply.

3535 Vigliani, E.C. (Univ. Milan, Italy): THE SO-CALLED "MAXIMUM ALLOWABLE BIOLOGICAL CONCENTRATIONS." Proceedings of the International Symposium on Maximum Allowable Concentrations of Toxic Substances in Industry, Prague, Czechoslovakia, April, 1959. Pure and Applied Chemistry 3, Nos. 1-2:285-8, 1961.

In his discussion, the author shows examples of what is measured in assessing the maximum biological concentrations (MABC), in which Pb is included; the MABC's used at the Clinica del Lavoro (Pb: 0.150 mg/l in urine and 0.8 mg/l blood; coproporphyrin: 0.1 mg/l urine and protoporphyrin, 1.0 mg/l red blood cells; TEL, 0.07 mg Pb/l in blood; advantages of determining the biological concentrations; limitations of the MABC's.

3536 World Health Organization: EUROPEAN STANDARDS FOR DRINKING WATER. Geneva, 1961, 52 pp.

Limits of tolerance for toxic substances in piped supplies are presented. The upper limit of concentration for Pb is 0.1 mg/l. In use of Pb piping, the concentration of Pb should not exceed 0.3 mg/l after 16 hr of contact with the pipes. References are given for methods of estimation.

3537 Zimmerman, J.G.: FOREIGN LAW COMMENT. Food, Drug, Cosmetic Law Journal 16:121-6 (Feb.), 1961.

A translation of the Latin-American Food Code, Chapter IV, is given. Materials and weldings of containers, utensils, wrappings, etc, which come into contact with food are not permitted to contain >1% Pb, and no Pb-containing paints, enamels, or varnishes may be used in the finishing of those articles. Pb or Sn foil containing too much Pb which are considered harmful, but do not rub off easily, may be used, provided that a sheet of white or waterproof paper is placed between them and the food. Granulated metals, small shot or bird shot used to clean receptacles and containers intended for food, etc must be free from Pb.

1962

3538 De Bruin, J. (Amsterdam, The Netherlands): Een merkwaardig geval van loodvergiftiging. (A REMARKABLE CASE OF LEAD INTOXICATION.) Nederlands Tijdschrift voor Geneeskunde 106:2273-6 (Nov.), 1962.

The author describes briefly the pattern he has followed for many years in the routine check-up and presents the graphs which repeatedly occur at the onset and in the therapy with CaEDTA of Pb intoxications. In exceptional cases there will be a break away from these graphs, an example of which is presented in the paper. The author claims that the graphs, as presented, never failed him in his experience as an occupational physician. In a case of chronic Pb poisoning, treatment with Ca_2EDTA seemed to be unsuccessful although large quantities of Pb were excreted. The suspicion arose that the patient continued to ingest Pb. When compensation for sickness was stopped, continued therapy with Ca_2EDTA quickly resulted in the patient's complete recovery.

3539 Elkins, H.B. (Massachusetts Div. Occup. Hyg., Boston): MAXIMUM ALLOWABLE CONCENTRATIONS OF MIXTURES. American Industrial Hygiene Association Journal 23:132-6 (Mar.-Apr.), 1962.

Because of the possible additive toxic effects of mixtures of industrial poisons as compared to pure substances, the author suggests establishing for their major component a MAC value somewhat lower than that established for the pure substance. A MAC of 0.15 mg for Pb in bronze fumes is recommended instead of 0.20 mg.

3540 Indian Council of Medical Research, New Delhi, India) MANUAL OF STANDARDS OF QUALITY FOR DRINKING WATER SUPPLIES. Special Report Series No. 44, 1962, 10 pp.

The manual states that drinking water supplies which contain Pb in excess of the MAC of 0.1 mg/l must be rejected as unfit for human consumption.

3541 Parkhomenko, G.M.: (MAXIMUM ALLOWABLE DOSES OF IRRADIATION AND CONCENTRATION OF RADIOACTIVE SUBSTANCES IN AIR AND WATER.) Radiats. Gigiena (Moscow: Gos. Izd. Med. Lit.) Sb. 1:31-9, 1962.

MAC and the relative biological effectiveness of γ- and β-rays, X rays, and α-particles, p, highly charge ions, emission nuclei, and thermal and fast n are presented. The MAC of external and internal irradiation are given. The MAC of 31 radioactive substances in the water of uncovered reservoirs, in the air of installations, and in atmosphere air of a sanitary-shielded zone and beyond its limits are presented. The MAC of SiO_2, Pb, Be, and Hg in air are given together with the maximum allowable levels of contamination of surfaces. (From Ref. Zh., Khim. 1963, Abstr. No. 141225; Chemical Abstracts 60:12855, 1964)

3542 US Public Health Service: DRINKING WATER STANDARDS, REVISED, 1962. Washington, D.C., 1962, 61 pp.

In a report of the Advisory Committee on Revision of USPHS 1946 Drinking Water Standards the following standards, as approved by the Secretary of Health, Education and Welfare and published in the Federal Register, are given for Pb: Presence of Pb in excess of 0.05 mg/l shall constitute grounds for rejection of the water supply. The following limits and ranges of Pb affecting health are also listed: Physiologically safe in water: life time, 0.05 mg/l, short period a few wk, 2-4 mg/l. Harmful range in water: borderline, 2-4 mg/l for 3 mo, toxic, 8-10 mg/l for several wk, lethal, unknown but probably >15 mg/l for several weeks.

1963

3543 American Conference of Governmental Industrial Hygienists: THRESHOLD LIMIT VALUES FOR 1963. ADOPTED AT THE 25th ANNUAL MEETING OF THE AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS, CINCINNATI, OHIO, MAY 6-10, 1963. Journal of Occupational Medicine 5:491-8 (Oct.), 1963.

The maximum average atmospheric concentrations of contaminants to which workers may be exposed for an 8-hr working day without injury to health are listed. These threshold limits are based on the best available information from industrial experience and experimental studies. They are intended for use in the field of industrial hygiene and should be interpreted and applied only by persons trained in this field. These values are reviewed annually by the Committee on Threshold Limits for revisions or additions as further information becomes available. The recommended threshold values for Pb and Pb arsenate in approximate milligrams of particulate per m^3 of air are 0.2 and 0.15, respectively.

3544 Denmark, Ministry of Social Affairs (Bundvad, K., and Kompmann, K.): Bekendtgørelse om regler for arbejde med blyholdig emalje. (NOTIFICATION CONCERNING RULES FOR WORK WITH LEAD-CONTAINING ENAMEL.) Ministry of Social Affairs (Socialministeriets), Copenhagen. January 26, 1963, 2 pp.

This regulation was put into force on March 1,

1963. It lists precautionary measures against Pb poisoning, especially in the jewelry industry, as follows: dust suppression during milling and agitating of enamel powder by local exhaust ventilation or watering; brushes and styli should never be moistened with the lips nor cleaned with the handkerchief; food and beverages should not be brought into the work place; hands and face should be washed and the mouth rinsed immediately when work is finished; no persons <18 yr of age should be employed; regular medical examinations should be made; dressing rooms should be equipped with separate compartments for work and town clothes and with washing facilities; etc.

3545 Teisinger, J. (Inst. Occup. Hyg., Prague, Czechoslovakia): PHARMACOLOGICAL ASSESSMENT OF MAXIMUM PERMISSIBLE CONCENTRATIONS. Pracovni Lekar. 15:48-51, 1963.
Official values for Pb which are 0.2 mg/m^3 of air in USA and 0.05 mg/m^3 of air in Czechoslovakia may be excessively high since the detoxication mechanism is less dependable in sudden absorption of relatively large doses than in regular intake of small doses used in pharmacologic experiments. (From Chemical Abstracts 59: 10682, 1963)

1964

3546 American Conference of Governmental Industrial Hygienists: THRESHOLD LIMIT VALUES FOR 1964. Archives of Environmental Health 9:545-54 (Oct.), 1964.
The threshold limit values, as adopted at the 26th Annual Meeting of the Conference, Philadelphia, Pa., April 1964, refer to airborne concentrations of substances and represent conditions under which it is believed that nearly all workers may be repeatedly exposed, day after day, without adverse effects. The values are based on the best available information from industrial experience, from experimental human and animal studies and, when possible, from a combination of the three. The threshold limits should be used only as guides in the control of health hazards and should not be regarded as fine lines between safe and dangerous concentrations.

Although most threshold limits have built-in safety factors to guard against adverse effects of moderate deviations from normal environments, judgments must be exercised in the proper adjustment to meet unusual conditions of heat, ultraviolet and ionizing radiation, overtime, and others. The limits should be interpreted and applied only by persons trained in the field of industrial hygiene. They are not intended for use, or for modification for use, as a relative index of toxicity, by making a ratio of 2 limits, in the evaluation of control of community air pollution or air pollution nuisances, in estimating the toxic potential of continuous uninterrupted exposures, or as proof or disproof of an existing disease or physical condition.

Generally, the values listed refer to time-weighted average concentrations for a normal workday, which might be exceeded, by certain amounts, for short periods of time.

Referring to threshold limit values of mixtures (Appendix B) containing several hazardous substances, in the absence of information to the contrary, the effects of the different hazards should be considered as additive.

The recommended threshold values for Pb and Pb arsenate in approximate mg/m^3 of air are 0.2 and 0.15, respectively. The tentative value for TEL at overall exposure by the cutaneous route, including mucous membranes and eyes, is 0.075 mg/m^3.

3547 Okusa, H. (Inst. for Science of Labour, Tokyo, Japan): ON THE MAC OF INJURIOUS SUBSTANCES IN INDUSTRIAL ENVIRONMENT (Report 2). Journal of Science of Labour (Tokyo) 40:141-5 (Apr.), 1964.
The Threshold Limit Values as published by the American Conference of Governmental Industrial Hygienists is criticized as follows: (1) "The average concentration and the ceiling seem to be confounded;" (2) some figures seem to be too high; (3) some values have not been revised for 20 yr or more; (4) the fact that the toxicity of metallic compounds varies with the state (fume or dust) in which these are present is ignored. The author introduces some data on MAC's established by Japanese scientists. For Pb, he quotes Horiuchi's value of 0.05 mg/m^3.

3548 Union of Soviet Socialist Republics (T. Nikolaeva, Chief San. Inspector): MAXIMUM PERMISSIBLE CONCENTRATIONS OF HARMFUL SUBSTANCES IN ATMOSPHERIC AIR OF POPULATED PLACES. Predel'no dopustimye kontsentratsii vrednykh veshchestv v atmosfernom vozdukhe naselennykh mest. Hygiene and Sanitation (Translation of Gigiena i Sanitariya) 29:166-8 (May), 1964.
The table containing the standards approved for 40 substances by the Chief Sanitary Inspector in June 1963, superseding the earlier values, lists for Pb and its compounds (with the exception of TEL) and for Pb sulfide 0.0007 and 0.0017 mg/m^3, respectively, as the MPC of average daily exposure. (TEL is not included in this listing.)

3549 U.S. Food and Drug Administration: COLOR ADDITIVES. TOASTED PARTIALLY DEFATTED COOKED COTTONSEED FLOUR; LISTING FOR FOOD USE; EXEMPTION FROM CERTIFICATION. Federal Register 29:1801-2 (Feb. 6), 1964.
Part 8 (Color Additives) of the Federal Food, Drug, and Cosmetic Act is amended by adding to Subpart B the new section 8.315 specifying that toasted partially defatted cooked cottonseed flour conform to the following specifications: As not >1 ppm; Pb, not >10 ppm; free gossypol, not >450 ppm. Toasted partially defatted cooked cottonseed flour may be safely used for coloring foods.

VIII. THERAPEUTIC USES

1954

3550 Griffiths, R.B. (Univ. Liverpool, England): THE APPLICATION OF SOME ANTHELMINTICS IN VETERINARY PRACTICE. Journal of Pharmacy and Pharmacology 6:921-43 (Dec.), 1954.

In veterinary practice anthelmintics are mainly used as adjuncts to the control of parasitic disease and as curative agents when prophylaxis either has not been practiced or failed. As prophylactic agents anthelmintics are used to eliminate the significant burdens of harmful parasites and the prevention of their further accumulation to clinical or sub-clinical levels. To achieve this the animals have to be dosed periodically, though the numerous species of animals involved have their own special requirements for particular drugs. It is well known that Pb arsenate and some others are effective no matter whether they are swallowed into the rumen or into the abomasum, while others must be swallowed directly into the abomasum. Pb arsenate as a cestode anthelmintic has been reported (Harwood and Guthrie) to remove tapeworms successfully from chickens, but too toxic for general use. It was also successful for the treatment of Monieria infection of sheep, lambs, kids and calves (McCulloch, Radeleff). Habermann and Carlson and Ward and Sales confirmed its value against M. expansa. Since knowledge of its toxicity is too incomplete, caution should be exercised especially in pregnant animals. Morgan et al, found a dose of 1 g to be 100% efficient against M. expansa in sheep while 0.5 g reduced the efficiency to 62%. Pb arsenate is compatible with phenothiazine and the 2 drugs can be administered together. Despite the high degree of efficiency against Moniezia, it has been shown that Pb arsenate is ineffective against the fringed tapeworm of ruminants, T. actinioides which lives in the bile ducts. (135 references, 8 on Pb arsenate.)

1955

3551 Anonymous: LOCAL USE OF LEAD OR TIN ACETATE. Queries and Minor Notes. Journal of the American Medical Association 157: 1266, 1955.

The questioner wished to know whether the local application of Pb acetate or Sn acetate results in any toxic manifestations. The answer was: Application of either Pb or Sn acetate to the unbroken skin causes no harmful effects of consequence. Percutaneous absorption is unlikely. In general, only some organic Pb compounds penetrate the skin. Damaged skin may react differently as to absorption chiefly with Pb, the more toxic of the 2 metals mentioned. However, the local application of such metallic salts is not wholly unaccompanied by physiological response. Rothman notes: "Salts of Pb, Sn, Cu, As, Bi, Sb, and Hg tend to form compounds with the fatty acids of the sebum. Thus an originally lipid-insoluble compound in aqueous solution may be transformed on or in the horny layer into a lipid-soluble metal oleate. The percutaneous absorption, then, quantitatively depends on this transformation. The same reaction may take place outside the body to a larger extent if the heavy metal or its salt is incorporated in ointment bases which contain fatty acids. This is one reason for the increased absorption of heavy-metal salts from some ointments as compared with their absorption from aqueous solutions."

3552 Monnet, R., Sabon, F., Grignon, H., and Viala, A. (Coll. Med., Algeria): (INVESTIGATION OF LEAD, HEAVY METALS, AND IRON IN CHEMICAL PRODUCTS IN THE FRENCH PHARMACOPEIA.) Ann. pharm. franç. 13:618-33, 1955.

The test with NaS described in the French Pharmacopeia is considered as obsolete. Comparisons with the tests of other pharmacopeias are made. (From Chemical Abstracts 50:6748, 1956)

1956

3553 Garkavi, B.L. (Vet. Inst. Krasnodar): EVALUATION OF LEAD ARSENITE IN MONIESIOSIS OF SHEEP. Veterinariya 33, No. 9: 41-2, 1956.

It was shown that Pb arsenite is 86-100% effective in this disease when given at dosage of 1 g/young animal and 2 g/older animal; the above levels failed to produce toxic symptoms. In actual treatment a dose of 0.5-1.0 g can be employed. (From Chemical Abstracts 51:1466, 1957).

3554 Shapiro, R. (Hosp. St. Raphael; Yale Univ. School Med., New Haven, Conn.): CHELATION IN CONTRAST ROENTGENOGRAPHY WITH SPECIAL REFERENCE TO LEAD DISODIUM EDTA. American Journal of Roentgenology, Radium Therapy and Nuclear Medicine 76:161-7, 1956.

The chemistry of chelation and the pharmacology and toxicology of $PbNa_2EDTA$ are reviewed. In experiments with cats and rabbits, excellent opacification was noted in kidneys, renal pelves and calyces, urinary bladder as well as of the cardiovascular system, liver and spleen. Unfortunately this agent is too toxic to have clinical usefulness; however, further study of chelates for use as contrast roentgenographic agents is suggested. (18 references)

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1957

3555 Yokozuka, S. (Nippon Med. School, Tokyo, Japan): THE ADJUVANT EFFECT OF DIBASIC LEAD ACETATE ON ANTIBODY PRODUCTION.) Nippon Saikingaku Zasshi 12:897-903, 1957.
Dibasic Pb acetate had bactericidal action on Salmonella typhosa, Shigella dysenteriae, and Escherichia coli, and treatment of these bacteria with this salt decreased their virulence markedly. The antigenicity of the vaccines prepared with thus treated bacteria was stronger than that of ordinary heated vaccines. Pb acetate could also be an adjuvant with diphtheria toxoid and egg albumin, representative protein antigens. (From Chemical Abstracts 53:1523, 1959)

1958

3556 Field, J.B., Kleetzel, M.C., and Thienes, C.H. (Univ. S. California, Los Angeles): NEW AGENTS FOR INHIBITION OF MOUSE TUMORS. In Cancer Chemotherapy Screening Data I. Cancer Research 18, No. 8, Part 2 (Supplement 5):365-71, 1958.
Among the substances tested as tumor-inhibiting agents against Sarcoma 180 and RC carcinoma in mice were the following Pb compounds: Pb chromate (empirical formula $PbCrO_4$), Pb nitrate ($Pb(NO_3)_2$) and Pb rubeanate ($C_2H_4N_2S_2$.Pb). Average reduction in tumor size was 25, 15, and 5% respectively.

1961

3557 Sarsunova, M., and Tölgyessy, J. (West Slovakian Reg. Health Inst., Pressburg, Czechoslovakia): Anwendung der Rückstreuungsmessung der β-Strahlung zur Kontrolle offizineller Salben, Pasten und anderer Zubereitungen mit Gehalt an Bleisalzen und Zinkoxyd. (USE OF THE MEASUREMENT OF THE SCATTERING OF β-RAYS FOR THE CONTROL OF OFFICIAL OINTMENTS, PASTES AND OTHER PREPARATIONS CONTAINING LEAD SALTS AND ZINC OXIDE.) Pharmazie 16:254-5 (May), 1961.
After comparison with findings by the complexometric method, the authors conclude that the title method gives accurate and reproducible results.

1962

3558 Führer, W., and Münzel, K. (Tech. Coll. Zürich, Switzerland): Die rheologische Normung des Unguentum Plumbi Hebrae Ph. Helv. V. (RHEOLOGICAL STANDARDIZATION OF UNGUENTUM PLUMBI HEBRAE PH. HELV. V.) Pharmaceutica Acta Helvetiae 37:38-47 (Jan.), 1962.
Hebra's ointment belongs to the group of soap-hydrocarbon gels. Pb plaster forms a net- or lattice-like framework of laminar micelles of soap responsible for its gel character. The prescription of the Ph. Helv. V is not satisfactory because it does not normalize the "consistency" of the ointment and it contains water which causes a hardening of the ointment during storage. In a series of successive trials with a given Pb plaster, that mixture had to be ascertained which yields a depth of penetration of 150-200 x 0.1 mm when measured with the penetrometer and in accordance with the USP XVI method. The Pb plaster has to be anhydrous and should therefore be examined as to the absence of water. (From authors' summary)

1963

3559 Bemrick, W.J. (Univ. of Minnesota, St. Paul): A COMPARISON OF SEVEN COMPOUNDS FOR GIARDIACIDAL ACTIVITY IN MUS MUSCULUS. Journal of Parasitology 49:819-23, 1963.
The following drugs were administered orally to laboratory mice to observe their effect on Giardia muris: phthalofyne, amphotericin B, nystatin, Pb arsenate, and a combination of nystatin and Atabrine. Each drug was given to an infected-treated and an infected-control group of animals. Pb arsenate was administered ad libitum in the feed and mixed at the rate of 5 mg Pb arsenate/1 g of ground feed. This was supplemented in some of the mice with a lysol-dipping procedure. Pb arsenate effectively removed Giardia from the intestines of the infected mice. It had 2 disadvantages: it was toxic to the host and the parasite could be demonstrated in the intestine only 4 days after treatment. Pb arsenate also had protozoacidal action on Hexamita muris, a flagellate of the small intestine of rodents.

3560 Brownlee, G. (King's Coll., Univ. London, England): OUTMODED TOXIC DRUGS. Proceedings of the Royal Society of Medicine 56, No. 2:127-9, 1963.
The author finds little justification in the continued use of Hg and digitalis pills as diuretics, strychnine, As, and opium, particularly when applied to the skin as Pb and opium lotion. Pb salts are stated to have negligible therapeutic, but much toxicologic interest. While they do not pass the unbroken skin, they are absorbed from abraded or ulcerated surfaces or from mucosa in toxic amounts.

3561 Körbler, J. (Zagreb, Yugoslavia): Zur Behandlung der Krebskrankheit mit Bleisalben im XVIII Jahrhundert. (ON THE TREATMENT OF CANCER WITH LEAD OINTMENTS IN THE 18th CENTURY.) Centaurus 9:212-5, 1963.
A review of the use of Pb-containing ointments for the treatment of cancer during the 18th century is presented.

3562 Szűcsné Császár, E. (Pharmacol. Inst. Budapest Coll. Med., Hungary): Adatok a hazai kenőcsalapanyagok, gyógyszeres kenőcsök es ipari védőkenőcsök laboratóriumi vizsgálatához. I. A tapadóképesség vizsgálata. (DATA ON LABORATORY STUDY OF HUNGARIAN OINTMENT BASES, PHARMACOLOGICAL OINTMENTS AND INDUSTRIAL PROTECTIVE OINTMENTS. I. EXAMINATION OF THEIR ADHESIVE CAPACITY.) Bőrgyógyászati és Venerológiai Szemle 39:57-63 (Mar.), 1963.
A Pb Tannate ointment ("Ungus Plumbi tannici") was among the 31 ointments and ointment bases analyzed for adhesive properties with a new procedure developed by the author and her colleagues.

Enlarging paper (9 x 12 cm) was imprinted first with the index finger as control, then with the same finger following application of 0.01 g of the ointment to be studied to the tip, and lightly spread for 45 sec with the aid of a thin metal spatula. Contact with the paper was maintained for 3 sec, prints were made in 4 rows of 5 each. The paper was then developed, fixed, and dried under constant conditions. The results showed that hydrophylic ointments had good adhesive properties; they were quickly absorbed by the skin. Ointments containing hydrocarbon gels, lipogels, lanolin, or mixtures of these were found to have varying adhesion, which was increased with increase in lipophyl per cent content. Because of changing amounts and ratios, the influence of solid material content (fatty oils, soaps, etc) could not be determined with absolute accuracy. Viscosity of the base also affected the adhesive properties of an ointment: the more viscous and firm liquid (such as lanolin) based ointments were more adhesive than the more fluid based (such as liquid paraffin).

It is recommended that evaluation of protective ointment qualities should include experimentation in industrial conditions as well as in the laboratory. Since these analyses in effect only determined whether the ointment in question was more adhesive to paper or skin, further experiments are planned using textiles, metals, glass and leather. (17 references)

1964

3563 Cancer Chemotherapy National Service Center: CANCER CHEMOTHERAPY SCREENING DATA XXXII WITH COMPLETE CUMULATIVE INDEX. Cancer Research 24, No. 11, Part 2, Supplement (Dec.), 1964.

As entered in the latest cumulated index of substances screened for chemotherapy of cancer, the following compounds of Pb have been so tested, with the pertinent references indicated in parentheses. Where toxicity data have been included, they are so noted.

Dimethyl-(3-(triphenylplumbyl)-propyl) ammonium methyl sulfate, 24 mg/kg toxic to mice (Cancer Research, Supplement 1, 1953, entry No. 1981); Pb subacetate, Pb chloride, Pb carbonate, Pb acetate, Pb iodide (ibid, Supplements 2-3, 1955, entries No. 3031, 3034, 3037, 3041, 3043, 6295); Pb chromate, Pb nitrate, Pb rubeanate (ibid, Supplement 5, 1958, entries No. 9916, 9917, 9918); Pb (II) salt of tartaric acid (ibid, Screening Data II-IV, 1959, entry No. 14533); Pb tetraacetate, 500 mg/kg caused 1 death in a group of 5 mice (ibid, Screening Data V-VIII, 1960, entry No. 17358); Pb (II) salt of bis(2-methylallyl) dithiocarbamic acid, Pb (II) derivative of ethanethiol, Pb (II) salt of 1-naphthalene sulfonic acid (ibid, Screening Data XIII-XVIII, 1962, entries No. 28429, 33579, 33589); trimethyllead chloride, triphenyllead chloride, triphenyllead iodide, triphenyllead, tetraphenyllead, Pb (II) salt of abietic acid (ibid, Screening Data XXIII-XXVI, 1963, entries No. 42041, 42053, 42054, 42095, 42265, 45546); Pb (II) derivative of 2-benzimidazolethiol, Pb (II) salt of ethylxanthic acid, Pb (II) salt of isopropylxanthic acid, Pb (II) derivative of 4,6,6-trimethyl-6H-1,3-thiazine-2-thiol, Pb (II) salt of O,O-bis(6-tert-butyl-m-tolyl) ester of phosphorodithioic acid, dilead (II) salt of N,N-bis(phosphonomethyl)-glycine (ibid, Screening Data XXVIII, 1964, entries No. 48688, 48819, 48824, 48832, 48850, 50028); Pb (II) salt of O,O-dithymyl ester of phosphorodithioic acid, Pb (II) chloride complex of the methyl ester of glycine, Pb (II) chloride complex of the methyl ester of alanine, tetrakis(tetrahydro-2-thienyl) lead, Pb (II) salt of 1-dodecanesulfonic acid (ibid, Screening Data XXXI, 1964, entries No. 54778, 54809, 54813, 55044, 56281).

3564 Carlsson, E., and Love, J.W. (Washington Univ. School of Med., St. Louis, Mo): LEAD COATING OF THE TRICUSPID VALVE IN DOGS. Acta Radiologica: Diagnosis 2:517-22 (Nov.), 1964.

A method was developed of applying a thin coating of an adhesive plastic impregnated with Pb as a radiopaque material to the endocardial surface of a dog's heart, which would be tolerated and compatible with survival, in order to study cineradiographically the dynamics of the cardiac valves as well as changes in volume and shape of the 4 cardiac chambers in a dog recovered from thoracotomy.

Six mongrel dogs, weighing 15-25 kg each, were used. The Pb-adhesive mixture, consisting of fine Pb powder (measuring ≤200 mesh), and Eastman 910 Adhesive, was prepared only a few minutes before application to avoid premature polymerization. This contrast medium was applied to the tricuspid valves by opening the heart after resection of a piece of the right auricular appendage. The Pb-adhesive mixture was fixed to the endocardial surface and covered by endothelium. Attempts are in progress to apply the Pb-adhesive mixture without cardiotomy by catheter introduced from the neck or groin and to produce stenosis of the pulmonic, aortic, tricuspid and mitral valve leaflets by application of the mixture.

Surface-coating of the intracardiac and intravascular structures of an experimental animal with such contrast medium offers a new approach to the study of the intricate intracardiac dynamics under normal and abnormal conditions.

IX. ANALYTICAL METHODS

1950

3565 Baker, R.W.R. (Guy's Hosp. Med. School London, England): POLAROGRAPHIC DETERMINATION OF LEAD IN URINE. Biochemical Journal 46:606-12, 1950

Two relatively rapid methods for the polarographic determination of pathologically increased Pb in urine are described, together with a modification for the estimation of lower concentrations. The quantitative recovery obtained in the entrainment procedures of Ross and Lucas (1935) is confirmed. Applications to cases of suspected Pb intoxication are described; there is evidence that BAL increases the excretion of Pb in the urine. Estimates have been obtained for the diffusion coefficients of the complex Pb ion in citrate buffer in the presence and absence of Ca. (17 references)

3566 Blaxter, K.L., and Allcroft, R. (Veterinary Lab., Weybridge, Surrey, England): LEAD AS A NUTRITIONAL HAZARD TO FARM ANIMALS. I. THE DETERMINATION OF LEAD IN BIOLOGICAL MATERIAL. Journal of Comparative Pathology and Therapeutics 60:133-9 (Apr.), 1950.

A rapid method for the determination of Pb in biological materials is described in which almost the entire operation is carried out in a 8 x 1 in Pyrex test tube. The material is subjected to rapid wet oxidation, ammonium citrate is added to prevent precipitation of earthy phosphates and interference by Fe, and the solution is rendered alkaline with ammonia. Cyanide is added to prevent interference by other metals, chloroform and dithizone are added and the excess reagent removed by alkaline cyanide. The extinction coefficient of the chloroform layer is then read photometrically. Minor modifications are given for urine and for materials such as bone, rich in Ca phosphate. The method is accurate to within ±3.2%.

3567 Cavanna, D., and Angeleri, C.: (SPECTROGRAPHIC DETERMINATION OF LEAD IN BLOOD.) Boll. Chim. Farm. 89, 213-9, 1950.

Blood (3 cc) was mixed with a solution of 5 µg Mo as a citrate salt, evaporated, and incinerated at 420° for 1 hr; then 1 drop of water was added, after which it was sparked between 2 pure C electrodes. Mo has a line at 2816 A which serves as a standard for the line of Pb at 2833 A. (From Chemical Abstracts 44: 8988, 1950)

3568 Chizhevskaya, M.S. (Molotov Med. Inst., USSR): Primenenie polyarograficheskogo metoda pri opredelenii svintsa v promyshlennykh stochnykh vodakh. (APPLICATION OF POLAROGRAPHIC METHOD TO DETERMINATION OF LEAD IN INDUSTRIAL WASTE WATERS.) Gigiena i Sanitariya 1950, No. 9:11-3.

Pb can be readily determined polarographically in waste liquors in an NH_4 acetate medium. The determination of 10 µg/ml is possible.

3569 Griffon, H., and Le Breton, R. (Préfecture Police, Paris, France): (STUDY OF THE DIAGNOSIS OF LEAD POISONING. A NEW METHOD OF ASSAY FOR LEAD IN BLOOD WITH APPLICATION TO OTHER ORGANIC MEDIA.) Ann. Méd. Légale, Criminol., Police Sci., Méd. Sociale et Toxicol. 30:335-40, 1950

The method involves digestion with HNO_3, electrolysis with Pt electrodes, solution of the cations, evaporation of the acid, solution of the residue in H_2O at pH 6.8, and colorimetry with diphenylcarbazone in CCl_4. Analyses of blood and tissues in cases of Pb poisoning are given. (From Chemical Abstracts 45:3292, 1951.)

3570 Gruszczýnski, T., and Słomińska-Czyżowa, E. (P.Z.H., Kielce, Poland): (DETERMINATION OF LEAD IN TOOTHPASTES.) Roczniki Państwowego Zakładu Hig. 1, 191-6, French summary, 196-7, 1950.

Samples were dried at 550-600°, dissolved in 10% nitric acid, and precipitated Sn was filtered off. Pb was determined in the filtrate by the colorimetric dithizone method; interference of other heavy metals was prevented by addition of citric acid and K cyanide. It was essential to use Pyrex ware and to adjust the pH to 8.5-10 before adding dithizone. Pb varied from 0.16-72 mg%, 5 mg% being the permissible content. The paste scraped off the inside of the tube after cutting it open had a 10 times higher Pb content than a sample squeezed out of the tube. (From Chemical Abstracts 45:6799, 1951)

3571 Hahn, F.L. (Univ. Mexico, Mexico City): Nachweis und Bestimmung von Bleispuren neben Zink. (DETECTION AND DETERMINATION OF TRACES OF LEAD IN THE PRESENCE OF ZINC.) Analitica Chemica Acta 4:453-7, 1950.

A very sensitive test for traces of Pb in the presence of large quantities of Zn is based on the fact that no ZnS is precipitated from strongly ammoniacal solutions by small quantities of H_2S. It is possible to detect 2×10^{-3} parts of Pb in 1 part of Zn, while somewhat greater contents can be measured colorimetrically. The assay of Pb as chromate in the presence of Zn is much easier and more sensitive in strongly ammoniacal than in acetic acid solution; the limit of Pb/Zn is 2.5×10^{-4}. (From author's summary)

3572 Lacroix, and Amsallem: Le dépistage

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pratique de l'intoxication saturnine. (PRACTICAL DETECTION OF LEAD POISONING.) Bulletin Académie Nationale de Médecine 134:430-1, 1950.

In the June 1949 issue of Cahiers Medicaux de l'Union Française, the authors, together with Portes, announced a simple method for the determination of porphyrin for the diagnosis of occupational Pb intoxication, which was named the urosilicotungstic-pyridic method, the technique of which is described as follows: Acidify 100 ml urine with 2 ml pure HCl, add 10 ml 5% silicotungstic acid, shake (a precipitate will form which contains porphyrin I and III), wash the precipitate 3-4 times with H_2O (distilled), dissolve in 4 ml pyridine, add 5% ethyl acetate, shake carefully, and examine in Wood's light. A red fluorescence indicates >4 µg porphyrin in 100 ml serum; a green fluorescence indicates either absence of porphyrin or <40 µg/l. A positive reaction was obtained in persons working with Pb, and the results are presented in tables.

3573 Michel, G., and Maron, N. (Univ. Liège, Belgium): Détermination polarographique du cuivre, du plomb, et du zinc dans les gélatines alimentaires, techniques et photographiques. (POLAROGRAPHIC DETERMINATION OF COPPER, LEAD AND ZINC IN EDIBLE, TECHNICAL AND PHOTOGRAPHIC GELATINS.) Analytica Chimica Acta 4:542-50, 1950.

The polarographic method was applied to the analysis of gelatins in order to increase the simplicity, rapidity and accuracy of the quantitative determination of traces of Cu, Pb and Zn. Ashing at 450°, and dissolving at a suitable pH, practically eliminates the eventual adsorption and coprecipitation due to the simultaneous presence of Fe, Al, and phosphates in commercial gelatins. (From authors' summary)

3574 Schrader, G. (Univ. Göttingen, Germany): Der quantitative Bleinachweis im Trinkwasser und im Blut. (QUANTITATIVE DETERMINATION OF LEAD IN DRINKING WATER AND IN BLOOD.) Klinische Wochenschrift 28:759 (Nov. 15), 1950.

See following abstract.

3575 Schrader, G. (Univ. Göttingen, Germany): Die Spektrographische Bestimmung von Blei im Trinkwasser und Blut. (SPECTROGRAPHIC DETERMINATION OF LEAD IN DRINKING WATER AND BLOOD.) Zeitschrift für Hygiene und Infektionskrankheiten 131:636-40, 1950.

By the method described, Pb in a 10-ml sample of venous blood can be determined by spectrography without addition of citrate. In analyses of 34 samples of blood submitted to the author's laboratory (11 workmen's compensation cases, 22 acute Pb poisoning, 1 with poisoning from waterborne Pb), 1 showed <100 µg/100 ml, 17 100-300, and 6 >300 µg Pb. The author considers values <100 µg/100 ml as not pathologic, and >300 µg to warrant suspicion of Pb poisoning even when signs and symptoms are not present.

3576 Valentinuzzi, M., González Lanuza, L.G., and Varela, J.O. (Inst. Public Health, Buenos Aires, Argentina): (POLAROGRAPHIC DETERMINATION OF LEAD IN THE BLOOD.) Semana Méd. (Buenos Aires) 1950, 1, 596-8.

The polarographic method of determining Pb in blood as introduced by Teisinger (1936) is rapid and simple. (From Chemical Abstracts 44:6906, 1950)

3577 Vuillet, H. (France): Porphyrinurie dans le saturnisme (dosage simplifié.) (PORPHYRINURIA IN LEAD POISONING (SIMPLIFIED METHOD).) Archives des Maladies Professionnelles de Médecine du Travail et de Sécurité Sociale 11:391-3, 1950.

A method for the determination of porphyrins developed by Senellart is described briefly and evaluated in comparison with counts of stippled cells. In the comparison the author used his 3 categories: (1) for those who are not at all exposed, (2) relatively little exposed, (3) highly exposed workers. In the method recommended by Senellart, the division was based on the µg Pb/l-urine. The comparison is tabulated. The author states that if he had to choose between the 2 tests, he would still prefer the basophilic stippling counts.

3578 Zakrzewski, K., Malec, J., and Komar, A. (Acad. Med., Warsaw, Poland): (DETERMINATION OF LEAD IN BLOOD.) Medycyna Doswiadczalna i Mikrobiologia 2, 577-85, 1950.

A wet digestion method for the determination of Pb in blood is described and Pb is determined according to Horwitt and Cowgill (1937). The method is an improvement over previously described procedures.

1951

3579 Frank, O., and Lachnit, V.: (DETERMINATION OF PORPHYRINS IN URINE OF WORKERS IN INDUSTRIES USING LEAD.) Wien. Ztschr. Inn. Med. 32:413 (Sept.), 1951.

The usefulness of de Langen and ten Berg's method for determining an increase of urinary coproporphyrins was tested in 715 workers in industries using Pb, including plumbers, Pb-founders, painters, color-grinders, enamel burners and compositors.

A slightly increased excretion of porphyrin was observed in the urine of 17 workers, and a more pronounced increase in that of 12. Because of possible errors, quantitative determinations were carried out in all instances in which limit values or positive results were obtained with the aforementioned method; pathologically increased 24-hr amounts were observed regularly. The maximum value was found to be 1,631.9 µg.

Of the workers with slightly increased concentration of porphyrin in the urine, no one presented any subjective or other objective signs of Pb poisoning; of those with pronouncedly increased porphyrinuria, 2 complained of refractory constipation and colics, and 1 had neuritic complaints. Sporadic basophilically stippled erythrocytes were demonstrated in blood streak preparations of 3 workers. The other workers had no subjective complaints, and neither the clinical state nor the morphological condition of the blood suggested the presence of an increased Pb stream.

With the reservation that there are other diseases which may be responsible for increased renal excretion of porphyrin, the described rapid method for determining an increase of urinary coproporphyrins is particularly suited for serial examination of workers in industries using Pb. (From Archives of Industrial Hygiene and Occupational Medicine 5:172 (Abstracts), 1952)

3580 Germek, O.A. (Univ. São Paulo, Brazil): (DETERMINATION OF LEAD IN URINE.) Anais Faculdade Farm. e Odontol., Univ. São Paulo 9, 123-35, 1951.

With Baker's method (1950), but using 3 times the amount of urine and dissolving the final precipitate in a solution of 10% tartaric acid in hydrochloric acid (Cranston and Nielsen, 1944), an average of 98.6% Pb was recovered. (From Chemical Abstracts 46:11292, 1952)

3581 Hart, H.V. (St. Albans, Herts, England): THE LEAD CONTENT OF WHEATEN FLOUR AND ITS DETERMINATION. Analyst 76:692-6 (Dec.), 1951.

The described method involves dry ashing of the samples, preliminary separation of Pb as the diethyldithiocarbonate complex and its determination absorptiometrically by the mixed color technique. Destruction of organic matter by dry ashing under controlled conditions has been investigated and shown not to result in any significant loss of Pb from flour. Quantities of Pb of <1 ppm were estimated with good duplications of results. In the samples of flour examined, the normal range of Pb was from 0.03-0.20 ppm (av 0.10). (From author's summary)

3582 Landry, A.S. (Inst. Inter-Am. Affairs, Lima, Peru): OPTIMUM RANGE FOR MAXIMUM ACCURACY IN BIOLOGICAL LEAD ANALYSES BY DITHIZONE. Industrial Health Monthly 11:103, 105 (July), 1951.

Because many methods involving photometric analyses are highly erroneous, the author checked the method he uses for Pb (Bambach and Burkey, 1942) for reassurance and also summarized the method of Ringbom (1939) for consideration by chemists working in the field of industrial hygiene. This was accomplished by plotting or logarithmic paper the per cent absorptance against a given range of concentrations, the maximum attainable accuracy being easily derived from the slope of the curve and the optimum range defined by inspection of the curvex (concentration range with the steepest slope). The author's method showed optimum results, ie, 4-40 μg Pb/aliquot of urine with a relative analytic error of 0.7%. The range could be extended to higher concentrations, with an increase in accuracy, by measuring transmittancy ratios.

3583 Mirnik, K. (Inst. Ind. Hyg., Zagreb, Yugoslavia): (THE ANALYSIS OF THE AIR FOR THE CONTENT OF LEAD IN A FACTORY FOR THE MANUFACTURE OF STORAGE BATTERIES.) Arhiv Hig. Rada 2:19-26, 1951.

In the sampling of air at many different points in the factory, 18 l. were collected at the rate 1.8 l/min. The temperature and the relative humidity were measured during the analyses. Analyses were made of urine and blood of 46 employees. Each sample of air was passed through traps with 10 ml of nitric acid. The Pb content of each sample was then measured directly by means of a polarograph. The procedure for determining Pb in the blood by polarography is described in detail. (From Chemical Abstracts 47:10402, 1953)

3584 Moser, R.E. (Oregon State Board Health, Portland): DETERMINATION OF LEAD IN ATMOSPHERE AND URINE. Industrial Health Monthly 11:94 (June), 1951.

In commenting on the Levine polarographic method (1945) for determining atmospheric Pb, the author found that if ethyl alcohol has been used to wash precipitator tubes, deposits of gummy material are formed, resulting in poor (high) polarographic results. Alcohol should be evaporated off before adding the nitric and hydrochloric acids.

In regard to the rapid screening test for urinary Pb (Cholak, Hubbard, and Burkey, 1948), the author feels that the ammonium solution of dithizone used in preparing the buffer solution is quite unstable and should be added to the solution containing the citrate, sulfite, and cyanide as soon as possible. His experience showed that allowing the dithizone to stand in ammonia even only a few minutes results in decomposition to such an extent that extremely weak colors with Pb are produced.

3585 Murata, H. (Osaka Munic. Tech. Res. Inst., Japan): (SPECTROCHEMICAL DETERMINATION OF LEAD IN SMALL QUANTITIES OF BLOOD.) J. Chem. Soc. Japan, Pure Chem. Sect. 72:863-5, 1951.

Pb in blood and urine was determined by an intermittent ac arc method with Bi as the internal standard, using lines Pb 2833 and Bi 2898 A. The sensitivity was 1 μg/ml Pb. About 30 μg Pb was found in 10 ml of blood of healthy Japanese persons by this method. This value is higher than the value determined by dithizone method. (From Chemical Abstracts 46:6696, 1952)

3586 Norris, A.W. (British Ceramic Res. Assoc.): THE SOLUBILITY OF LEAD GLAZES. PART III. A STANDARD SPECIFICATION FOR LEAD BISILICATE. Transactions of the British Ceramic Society 50:249-56, 1951.

The problem of producing Pb glazes that will conform to the 5% solubility limit is examined with especial reference to high Pb content types. The effect of the 2 main factors (variables) governing the solubility of a Pb glaze (the intrinsic solubility of the frit used and the degree of fineness) is considered. The paper also contains a suggested quality specification for Pb bisilicate.

3587 Norris, A.W., and Bennett, H. (British Ceramic Res. Assoc.): THE SOLUBILITY OF LEAD GLAZES. PART I. PHYSICAL ASPECTS OF SOLUBILITY DETERMINATION. Transactions of the British Ceramic Society 50:225-39, 1951.

During 1947 and 1948 an investigation was carried out into the significance of certain of the physical conditions under which the solubility of frits is determined. The importance of total acid-contact time and the effect of temperature on various Pb bisilicate frits are discussed. It is suggested that the test requirements of the Factory Acts might well be reviewed, to give greater accuracy, especially since, for some time at least, glazes with solubilities approaching the 5% limit will be common in some sections of the pottery industry. (From authors' summary)

3588 Norris, A.W., and Vaughan, F. (British Ceramic Res. Assoc.): THE SOLUBILITY OF LEAD GLAZES. PART II. A MODIFIED TEST METHOD. Transactions of the British Ceramic Society 50:240-5, 1951.

A modified method for the measure of Pb solubility of frit is devised and shown to be satisfactory for values <10-15%. Shaking is eliminated, thus enabling temperature control to be obtained more conveniently.

3589 Portillo, R., and Sanz Pedrero, P. (Inst. Gregorio Rocasolano, Madrid, Spain): (POLAROGRAPHIC STUDIES. XIV. DETERMINATION OF VERY SMALL QUANTITIES OF LEAD IN BIOLOGICAL MATERIAL.) Anales Real Soc. Españ. Fís. y Quím. 47B:413-8, 1951.

The organic matter is decomposed by H_2SO_4 and HNO_2, preferably in a fused quartz vessel; Pb is extracted with NH_4 citrate (pH 5-6). Polarographic determination is made in a supporting solution containing Na_2SO_3 and NaOH. The maximum sensitivity of the galvanometer and the compensating circuit of Ilkovic and Semerano are used. The cathodic reduction potential is −0.36 v. The method of wave increments is recommended. (From Chemical Abstracts 46:8171, 1952)

3590 Sehl, F.W., and Havens, B.J., Jr. (Aetna Casualty & Surety Co., Hartford, Conn.): A MODIFIED AIR SAMPLER EMPLOYING FIBERGLAS. A.M.A. Archives of Industrial Hygiene and Occupational Medicine 3:98-100 (Jan.), 1951.

The new air sampler is a practical and efficient device for the determination of airborne dust and especially fume. The materials used in the sampler contain no organic matter and, therefore, present no analytical difficulties arising from this source. The sampler can be sealed immediately after the sample has been taken, so that there is no chance of loss or contamination. The instrument is recommended for use by industrial hygienists for the determination of toxic particulate matter. Tests to determine whether fumes would be retained in the sampler included Pb oxide fumes.

3591 Stein, C. (Food and Drug Admin., Washington, D.C.): REPORT ON HEAVY METALS IN COAL-TAR COLORS - LEAD AND BISMUTH. Journal of the Association of Official Agricultural Chemists 34:422-7, 1951.

A dithizone method for separation and determination of microquantities of Pb and Bi in coal-tar colors is described. Pb is determined colorimetrically or by electrolysis and titration; Bi is determined colorimetrically.

3592 Valentinuzzi, M., and Gonzalez Lanuza, L.G. (Public Safety Ministry, Buenos Aires, Argentina): (POLAROGRAPHIC DETERMINATION OF LEAD IN BLOOD WITH MULTIPLE ELECTRODES.) Anales Soc. Cient. Argentina 151:215-24, 1951.

A procedure is described for polarographic estimation of Pb in blood, using 2-5 dropping Hg electrodes and 1 anode. The wave for Pb is ~2 mm in height for normals, with 1 electrode. With multiple electrodes the wave height is increased directly with the number, and more exact determination is possible. Clinical mobilization of Pb before analysis is stressed. Photographs of the polarograph waves are given. (From Chemical Abstracts 46:4041, 1952)

3593 Vesterberg, R. (Natl. Inst. Publ. Health, Tomteboda, Sweden): Erfahrungen uber Mikrobestimmungen von Quecksilber und Blei in biologischem Material. (EXPERIENCES IN MICRODETERMINATION OF MERCURY AND LEAD IN BIOLOGICAL MATERIALS.) Mikrochemie 36/37: 967-72, 1951.

The methods for the determination of Pb and Hg worked out in the Swedish Industrial Hygiene Institute, and previously published, have been the subject of >5500 studies. Special mineralizing procedures have been developed for both methods. A special vacuum concentration is first applied when solutions are being examined for their Pb content. The final determination is made with dithizone or naphthyldithizone. Schematic reviews of the procedural details to be maintained are given. (From author's summary)

3594 Vesterberg, R., and Sjöholm, O. (Natl. Inst. Pub. Health, Tomteboda, Sweden): MICRODETERMINATION OF LEAD IN BIOLOGICAL MATERIAL. Mikrochemie 38:81-91, 1951.

Two photometric methods for the microdetermination of Pb are described. The 1st is based on a "one-color" dithizone procedure and the accuracy is mostly sufficient for analysis of biological material such as urine. A more sensitive and accurate determination can be made with the reagent di-β-naphthylthiocarbazone. The samples are mineralized with the aid of nitric acid, hydrogen peroxide and K chlorate. Urine samples are concentrated through evaporation in vacuum before decomposition. (From authors' summary)

3595 Wildführ, G., and Mücke, D. (Univ. Leipzig, Germany): Zur Frage der optimalen Färbung der basophil getüpfelten Erythrocyten. (OPTIMAL STAINING OF BASOPHILIC STIPPLING OF ERYTHROCYTES.) Deutsches Gesundheitswesen 6, No. 10:285-6, 1951.

The 2 most commonly used blood staining methods for the detection of basophilic stippled erythrocytes (the differential blood staining method by Giemsa and the Manson stain) were compared in order to find the method best suited to mass screening of Pb exposed workers. (The modification of the Manson stain by Pesch and Lemke with alcoholic Al-Morin-solution has not been widely accepted.)

Blood specimens of a group of 286 Pb exposed workers were tested with the Giemsa method and those of a group of 129 with the Manson stain, resulting in a significant discrepancy in the mean values of the 2 groups in favor of the Manson stain. The values averaged 232 ± 1.07 for the 1st group and 264 ± 1.05 for the 2nd, a yield 14% higher with the Manson stain. This discrepancy may seem small, yet it suffices to point to the Manson stain as the superior method.

Blood specimens from 129 persons were treated with both methods and comparison of the counts had the following results: In 77 cases (60%) the Manson stain showed greater counts; in 31 cases (24%) the Giemsa method showed greater counts; and in 20 cases (16%) both counts showed the same results. This evaluation also speaks in favor of the Manson stain.

1952

3596 Brustier, V., Cornec, P., and Triché, H. (France): Dosage spectrographique du plomb dans le sang. (SPECTROGRAPHIC DETERMINATION OF LEAD IN BLOOD.) Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences 234:2367-9, 1952.

The spectrogram of powdered dried blood containing $SnCl_4$ as an internal standard was compared with that of a standardized powder containing known amounts of Pb (50, 100, 200 μg/100 ml), the internal standard, graphite, and all the blood cations. The Pb contaminants of the synthetic solution containing the blood elements are eliminated by the coprecipitation of PbS with HgS. An AC arc is used to excite the high frequencies. The method is accurate to within 5-10%. The upper limit of normal Pb concentration in the blood is 70 μg/100 ml.

3597 Bykhovskaya, M.S., and Poletaev, M.I. (Inst. Ind. Hyg. Occup. Dis., Acad. Med. Sci., USSR): Polyarograficheskii metod pri sanitarno-gigienicheskikh issledovaniyakh. (POLAROGRAPHIC METHOD IN HYGIENIC INVESTIGATIONS.) Gigiena i Sanitariya 1952, No. 12:47-50.

A polarographic method for the determination of small concentrations of Pb in air, without interference of Cu and Zn is described. Reagents used are 5% solution of nitric acid, 30% ammonium acetate, 1% Na acetate and 1% acetic acid solutions. Methods for separate determinations of Pb, Cu and Zn and the determination of Pb in blood are recommended.

3598 El-Badry, H.M., and Wilson, C.L. (Queen's Univ. Belfast, Ireland): THE GRAVIMETRIC DETERMINATION OF LEAD, SILVER AND MERCUROUS MERCURY ON THE MICROGRAM SCALE. Analyst 77:596-601 (Nov.), 1952.

With samples containing ~10 μg of cation, it is expected to estimate the elements of Pb, Hg, and Ag gravimetrically with an accuracy of ~±1%. (From authors' summary; 14 references)

3599 Fukumura, S., and Fujisawa, Y. (Dept. Biochem.): A STUDY ON THE URINARY COPROPORPHYRIN. 1. A COMPARISON OF TWO QUALITATIVE DETERMINATION METHODS. 2. A SIMPLE QUANTITATIVE DETERMINATION METHOD. Medicine and Biology (Japan) 24:114-5 (Aug.); 161-3 (Sept.), 1952. In Contributions from the Department of Preventive Medicine and Public Health, Osaka City University Medical School. Vol. 1, April 1949-March 1959, p. 41.

3600 Horiuchi, K., Miki, M., and Murata, H. (Osaka City Univ., Japan): INDUSTRIAL LEAD POISONING. I. SPECTROPHOTOMETRIC MICRODETERMINATION OF LEAD IN BIOLOGICAL MATERIALS. Igaku to Seibutsugaku (Med. and Biol.) 25:152-4, 1952.

Pb in biological materials was determined spectrophotometrically with Hilger E_3 quartz spectrophotometer, and the intensity of a Pb line at 2833 A was determined with a microphotometer, using a Bi line at 2898 A as an inner standard. Samples (1-2 g) containing ~10 μg Pb/100 g biological fluids (blood, feces, etc.) were determined with an error of 10%. (From Chemical Abstracts 47:10606, 1953)

3601 Horiuchi, K., Takada, I., and Tamori, E. (Osaka City Univ., Japan): INDUSTRIAL LEAD POISONING. II. A MODIFIED DITHIZONE METHOD FOR THE DETERMINATION OF LEAD. Igaku to Seibutsugaku (Med. and Biol.) 25:287-90, 1952.

Samples were digested in an electric furnace, the digest dissolved in a mixture of HNO_3 and HCl, and the solution was treated with NH_4 citrate, NH_2OH-HCl, KCN, and dithizone in $CHCl_3$. Pb in $CHCl_3$ was extracted with HNO_3, then extracted again with dithizone-$CHCl_3$ in the presence of KCN and NH_4OH, and the color intensity of the $CHCl_3$ layer read in a photoelectric colorimeter at 510 mμ. Recovery of added Pb was not <95%. Details of the procedure are given. (From Chemical Abstracts 47:10606, 1953).

3602 Keenan, R.G., and Byers, D.H. (Div. Occup. Health, US Public Health Serv., Cincinnati, O.): RAPID ANALYTICAL METHOD FOR AIR-POLLUTION SURVEYS. THE DETERMINATION OF TOTAL PARTICULATES AND THE RAPID SEMI-QUANTITATIVE SPECTROGRAPHIC METHOD OF ANALYSIS OF THE METALLIC CONSTITUENTS IN HIGH-VOLUME SAMPLES. A.M.A. Archives of Industrial Hygiene and Occupational Medicine 6:226-30 (Sept.), 1952.

In connection with air pollution investigations in the Detroit-Windsor area, a qualitative and semi-quantitative study carried out to determine particulate contaminants containing metallic elements in total air is described. Samples were collected daily for 6 wk at 31 stations; ~1200 samples were analyzed for 21 elements in each. Since time did not permit the development of a quantitative method for each of the elements (Si, Al, Fe, Ca, Mg, Pb, Zn, Mn, Cu, Ti, Sn, Mo, Ba, Cd, Cr, Ni, Sb, V, Co, Be), the authors developed a semiquantitative method. The entire procedure, as described, was: passing air through a high-volume pleated paper air sampler, weighing the residue collected, removing the deposits by washing with ethyl alcohol, wet-ashing with concentrated HNO_3, and H_2SO_4, treating with HCl, adding to electrodes of a spectrograph, and evaluating the concentrations by comparison with spectrograms from prepared standards. The averages of Pb found in Detroit, Windsor, and

Charleston, W.Va., were 0.4, 0.7, and 0.2 μg/m^3 of air, respectively. The authors comment that this semiquantitative spectrographic method does not provide the accuracy of either the chemical or spectrographic quantitative method, but, it yielded results which were adequate for statistical analyses to obtain the desired information for the planning of epidemiologic and engineering programs.

3603 Kelley, M.T., and Miller, H.H.: A HIGH SENSITIVITY RECORDING POLAROGRAPH. U.S. Atomic Energy Commission Document No. ORNL-842, 1952, 19 pp.

The high sensitivity polarograph described is capable of measuring diffusion currents over a range of from 0.001-10 μ amp. The instrument incorporates a compensator for nullifying the objectionable effects of condensor currents on polarographic waves and also a "curve follower" correction device for subtracting blank curves from those obtained on samples. Using this device, diffusion currents for Pb have been measured in the region $0.2 \times 10^{-6} - 2 \times 10^{-6}$M.

3604 Khrustaleva, V.A. (Moscow City San.-Epidemiol. Station): DIFFERENTIAL DETERMINATION OF ORGANIC AND INORGANIC LEAD IN THE AIR OF GARAGES. Gigiena i Sanitariya 1952, No. 9:48-9. In Levine, B.S.: U.S.S.R. Literature on Air Pollution and Related Occupational Diseases. Washington, U.S. Department of Commerce, Office of Technical Services, 1960, Vol. 2, pp. 8-10.

The Gor'kii Institute of Labor Hygiene and Occupational Diseases had proposed that the MPC of TEL be set at 0.005 mg/m^3 (equivalent to 0.003 mg/m^3 Pb). Following a discussion of the disadvantages of the sampling and determination methods specified by the Institute, the author proposes for the collection of TEL air samples the use of conventional equipment, such as a suction dust collector, a high velocity flowmeter, corrugated tubes as adapters for cotton filters to retain metallic Pb and Petri tubes containing 10 ml alcohol for the absorption of TEL. The set-up as described enables the aspiration of 600-720 l. air in 1 hr. The alcohol from all Petri tubes is poured into 1 container and TEL is determined by the usual method. The cotton from the corrugated tubes is treated with HNO_3 and the metallic Pb is determined. Up to 1 m^3 could be aspirated in 1-1/2 hr by this method and to accumulate sufficient TEL for a precise determination.

3605 Kitamura, S., Yoshida, K., and Sano, S. (Kyoto Univ., Japan): SOME CAUTIONS NECESSARY FOR DETERMINATION OF LEAD BY THE DITHIZONE METHOD. Japan. J. Nation's Health 21:118-20, 1952.

For estimation of Pb in blood, NH_4 citrate and NH_4 hydroxide are added to pH 10-11, then 10% KCN is added to turn the solution green to yellow (thymol blue) and a large amount of NH_4OH-HCl added. The mixture is kept for 5 min and the method continued as usual. If a precipitate forms on the addition of NH_4 citrate, as takes place in the case of bones and urine, the solution is acidified with 0.3N HCl, 5 mg $CuSO_4$ added, H_2S passed through solution for 3-5 min, the precipitate centrifuged, taken up in 6N HNO_3. NH_4 citrate and NH_4OH added to pH 11.5, then the solution is extracted with a large excess of KCN and NH_2OH-HCl. (From Chemical Abstracts 47:11300, 1953)

3606 Kellogg, H.W., Mahlke, E.F., and Jones, J.T. (Ethyl Corp., New York, N.Y.): SAVE TIME IN TEL ($PbEt_4$) ANALYSES. Petroleum Processing 7:1430-2, 1952.

TEL in gasoline is determined by X-ray photometry.

3607 Matochová, L.: (POLAROGRAPHIC METHOD OF ESTIMATION OF LEAD IN URINE BY MEANS OF ION EXCHANGERS.) Prac. Lék. 4:221 (June), 1952

A polarographic method of estimation of Pb in urine by means of an ion exchanger is described. The principle of the method lies in the absorption of Pb onto the ion exchanger and its regeneration in 7N HCl. If 25 ml of urine and 5 ml of ion exchanger are used, this method will allow the Pb to be estimated within a range of 1-10 μg, ie, 4-40 μg%. If a greater or smaller quantity of urine or ion exchanger is used, this range may move up or down. (From English summary; Archives of Industrial Hygiene and Occupational Medicine 7:179 (Abstracts), 1953)

3608 Weber, O.A., Voloder, K., and Vouk, V.B.: (DETERMINATION OF LEAD IN BLOOD.) Arhiv Hig. Rada 3:296-313, 1952.

A monocolor dithizone method for the determination of Pb in blood is described. The main points in which the proposed method differs from the usual dithizone method are the following: (1) Extraction of Pb with dithizone is performed at rather high pH values (10.5) and (2) the Fe is removed after mineralization of blood by means of 2% aqueous cupferron solution. The first modification increases the sensitivity of the method and at the same time dispenses with the necessity of washing the Pb dithizonate solution to remove the excess dithizone before measuring the extinction. The cupferron extraction eliminates all the possible sources of error which are connected with the presence of Fe.

The statistical treatment of the calibration curves shows that the method is reliable, sensitive, and precise. The standard error of a single determination is not more than ±7 μg for Pb concentrations from 25-500 μg/100 ml of blood if the measurement of the optical density is performed with a Beckman spectrophotometer at 520 mμ. If 2 parallel determinations are made in each analysis, the standard error may be reduced to ±5 μg. (From English Summary; Archives of Industrial Hygiene and Occupational Medicine 7:443 (Abstracts), 1953)

3609 Weidner, H., and Hunold, G.A. (State Dept. of Health; Robert Koch Inst. Hyg. Infectious Dis., Berlin, Germany): Porphyrinbestimmung im Urin von Bleiarbeitern. (DETERMINATION OF PORPHYRIN IN THE URINE OF LEAD WORKERS.) Zentralblatt für Arbeitsmedizin und Arbeitsschutz 2:187-9 (Nov.), 1952.

Determination of porphyrin in the urine is a reliable test in the early diagnosis of Pb intoxication. A rapid method for determination is described. Porphyrin is extracted from the urine and its fluorescence under UV light is examined and compared with standard solutions containing 100 μg% and 1000 μg% porphyrin. With some practice, 2-3 porphyrin extractions can be done simultaneously. The entire procedure takes less time than the preparation and examination of blood smears for stippled cells, and the results are more reliable.

1953

3610 Amdur, M.O. (Dept. Ind. Hyg., Harvard School of Public Health, Boston, Mass.): RAPID DETERMINATION OF LEAD IN OLD URINE SAMPLES. A.M.A. Archives of Industrial Hygiene and Occupational Medicine 7:277-81 (Apr.), 1953.

By the extraction of old urine samples containing 10% by volume of nitric acid with n-butanol, analysis can be made for Pb by the screening method of Cholak even after several months of standing. Thymol is used as a preservative. The method gives good agreement with 2 independent methods. (From author's summary)

3611 Bennett, A., and Hudson, J.R.: MODIFIED DITHIZONE PROCEDURE FOR DETERMINATION OF LEAD IN BEER. Journal of the Institute of Brewing 59:137-40, 1953.

Difficulties encountered in carrying out the reference method are minimized by a modified method in which the wet-ashed sample is extracted with dithizone in toluene and the color complex measured directly in a photoelectric colorimeter against standards. In an alternative method a dithizone-chloroform extract is obtained, 1/2 of which is measured directly in a Spekker colorimeter and 1/2 measured after shaking with dilute H_2SO_4. The difference between the readings is the reversion value; this is compared against reversion values of standard amounts of Pb.

3612 Bennett, H., and Vaughan, F. (British Ceramic Res. Assoc.): THE SOLUBILITY OF LEAD GLAZES. PART IV. INVESTIGATION OF CERTAIN CHEMICAL METHODS OF LEAD DETERMINATION. Transactions of the British Ceramic Society 52:578-87, 1953.

Various methods are outlined for the determination of Pb in solutions derived from the attack of HCl on Pb frits. A chromate method, with gravimetric or volumetric finish, has been found satisfactory. An investigation into the effect of contaminating ions on this method is included. Fe, Sn, and Ti are found to yield high results due to coprecipitation. The authors conclude that the accuracy of the chromate method is as good as that of the sulfide-sulfate method, provided that certain interfering ions are absent. Because of its simplicity and increased rapidity, determination may be completed in 24 hr. If, however, other ions are in the solution, from which the Pb is to be precipitated, then the method is not as reliable as the sulfate method.

3613 Bishop, L.R., and Kloss, C.A.: ESTIMATION OF TRACES OF LEAD IN LIQUIDS: ESTIMATION BY ENTRAINMENT. Journal of the Institute of Brewing 59: 213-8, 1953

Ca phosphate or Ca carbonate entrainment was shown to be a satisfactory way of removing traces of Pb from solution and enabled Pb to be determined with sufficient accuracy to satisfy recent legislative requirements. The dissolved Pb may be estimated as PbS or with dithizone. If >1 ppm of Fe is present, either it must be removed or the Pb precipitated as oxalate.

3614 Bobtelsky, M., and Graus, B. (Hebrew Univ., Jerusalem, Israel): A PRECISE HETEROMETRIC MICRODETERMINATION OF LEAD CITRIC ACID. Analytica Chimica Acta 9:163-7, 1953.

A new heterometric method is presented for the microdetermination of Pb with alkali citrate or for the microdetermination of citric acid with Pb nitrate solution. The analyzed solution may contain 0.1-1.0 mg/ml of Pb or citric acid. The error is <1% in 50% alcoholic solution. (From authors' summary)

3615 El Badry, H.M., and Wilson, C.L. (Queen's Univ., Belfast, N. Ireland): CHEMICAL ANALYSIS ON THE MICROGRAM SCALE. II. SEPARATION AND IDENTIFICATION OF LEAD, MERCUROUS MERCURY, SILVER, AND TUNGSTATE. III. SEMI-QUANTITATIVE ESTIMATION OF LEAD, MERCUROUS MERCURY, SILVER, AND TUNGSTEN. Mikrochemie Vereinigt mit Mikrochimica Acta 40:218-24; 225-9, 1953.

II. Because of the tendency of HCl vapor to precipitate the ions of the group when the container charged with the stock solution of the ion is placed on the carrier beside the reagent container, a 1:1 HCl solution is recommended as group precipitant. Other reagents were ammonium acetate and K cyanide. For Pb, 2 confirmatory tests were performed, ie, the dithizone and the K chromate.

III. Estimation of the title cations is described with an approximate variation of 10%. Pb was estimated as Pb chromate after treatment with aqueous K chromate solution.

3616 Elkins, H.B.; Elkins, H.B., and Rutolo, B.P.W. (Massachusetts Dept. Labor & Ind.): NOTES ON DETERMINATION OF LEAD BY DITHIZONE METHOD. I. EFFECTS OF IMPURITIES IN CYANIDE; II. INTERFERENCE FROM BISMUTH AND TIN. American Industrial Hygiene Association Quarterly 14:109-11; 111-2 (June), 195).

I. Fresh NaCN solutions used in determining Pb were found to suppress the extraction of Pb by dithizone. This action is probably due to the presence of S in the NaCN. As little as 0.003% shows the effect, and can be minimized by aging the NaCN solutions for at least 1 wk.

II. The substitution of HCl for HNO_3 in the solution used for collecting air samples for determining Pb provides satisfactory control of Sn occurring as a component of the Pb-bearing material sampled. The therapeutic im administration of Bi compounds affects urinary Pb determinations by producing erroneously high results, but Bi assimilated by prolonged ingestion does not affect Pb determinations. The incidence of Bi therapy is considered too low to warrant alteration of routine procedures to eliminate Bi interference, unless a single urine sample is of major importance.

3617 First, M.W., and Silverman, L. (US Atomic Energy Comm., Harvard Univ., Boston, Mass.): AIR SAMPLING WITH MEMBRANE FILTERS. A.M.A. Archives of Industrial Hygiene and Occupational Medicine 7:1-11 (Jan.), 1953.

Only recently have membrane filters become available commercially and used in the field of sanitary bacteriology. This report deals with an investigation for industrial hygiene application, since a recent Russian article described their use for dust sampling. As summarized by the authors, comparative dust counts with the use of membrane filters and the midget impinger indicate that comparable counts may be obtained with the filters with an appreciable saving in time, labor, and equipment. Acid mists and metal fumes (including Pb) may be collected at nearly 100% efficiency, and in many cases sufficient sample for analysis may be collected conveniently with a 600 ml handpump. Applications to particle size separations and electron microscopy are subjects for further investigation.

3618 Heggen, G.E., and Strock, L.W. (Albany Med. Coll.; Saratoga Springs Comm. Res. Lab., N.Y.): DETERMINATIONS OF TRACE ELEMENTS COMBINING CHEMICAL ENRICHMENT AND SPECTROCHEMICAL METHODS. Analytical Chemistry 25:859-63 (June), 1953.

Determination of trace elements in a variety of materials usually require enrichment of the elements, sample conversion to a form suitable for analysis, and different spectrochemical calibrations. A method is described whereby organic complexing reagents are used for the separation and enrichment of 14 trace elements, including Pb, along with In, which is the internal standard and base material for the direct current arc spectrographic analysis. The elements are present as oxides in arcing mixtures with a constant base material, regardless of the type of the original sample. Thus the same spectrochemical calibrations can be used. These methods have been applied for >5 yr to analyze widely different types of samples such as waters, snow, rock and minerals, soils, coals, petroleum, plant materials, and biological tissues and fluids, in geochemical, agricultural, and medical research.

3619 Horiuchi, K., and Ida, N.: A MODIFIED POLAROGRAPHIC DETERMINATION METHOD FOR THE TRACE OF LEAD IN BIOLOGICAL MATERIALS. Medicine and Biology (Japan) 26:98-100 (Feb.), 1953. In Contributions from the Department of Preventive Medicine and Public Health, Osaka City University Medical School. Vol. 1, April 1949-March 1959, p. 31.

3620 Horiuchi, K., Takada, I., and Tamori, E.: A MODIFIED MIXED-COLOR DITHIZONE METHOD FOR THE DETERMINATION OF LEAD IN BIOLOGICAL MATERIALS. Journal of Osaka City Medical Center, 2:97-103 (Jan.), 1953. In Contributions from the Department of Preventive Medicine and Public Health, Osaka City University Medical School. Vol. 1, April 1949-March 1959, pp. 31-2.

The title method for the determination of Pb in air, water, and biological materials is described. The accuracy of the method was established, after addition of 2.0, 5.0, 10.0, 30.0 and 50.0 μg Pb, by the recovery of 2.0, 4.8, 9.7, 29.5, 49.5 μg, respectively.

3621 Irving, H.M., and Butler, E.J. (Radcliffe Inf., Oxford, England): A REVERSION METHOD FOR THE ABSORPTIOMETRIC DETERMINATION OF TRACES OF LEAD WITH DITHIZONE. Analyst 78:571-80 (Oct.), 1953.

The procedure involves wet ashing, extraction of all the Pb and Bi, if the latter is present, with dithizone, a preliminary separation from the bulk of the Bi, and a final absorptiometric determination of Pb by the "reversion" technique. Quantities of Pb in the range of 0-2 μg can be determined satisfactorily in the presence of up to 20 μg Bi and at least 100 μg Cu or Zn. (From author's summary; 16 references)

3622 Johnston, J.H.St., and Taylor, A.E.: RAPID METHOD FOR ESTIMATION OF LEAD IN BEER. Journal of the Institute of Brewing 59:141-2, 1953.

The method is suitable as a rapid test and gives results differing by not >0.1 ppm from those of the reference method. The sample is evaporated with HNO_3, dry-ashed at 500°, 1/2 of the ash dissolved in HCl, treated with NH_3, and citric acid sufficient to dissolve any precipitate, and KCN and H_2S or Na_2S solution to a final pH of 6 are added. The color produced is compared against those of standards.

3623 Kito, T. (Kyushu Univ., Fukuoka, Japan): MEASUREMENT OF LEAD IN AIR DUST BY POLAROGRAPHY. Igaku Kenkyuu 23:1289-1308, 1953.

With a jet dust-counter 50-1000 ml of air is drawn and Pb dust is precipitated on a cover glass, dissolved in HNO_3, evaporated, and dried. It is then dissolved in a supporting electrolyte and measured by polarography. Alternately, air containing Pb dust is sucked through purified water in an impinger. HNO_3 is added, evaporated, dried, and redissolved in the electrolyte. Glycine was the most suitable suppressor of Pd. Other inorganic matters can be measured simultaneously. (From Chemical Abstracts 47:12701, 1953)

3624 Letonoff, R.V., and Reinhold, J.G. (Veterans Adm. Hosp., Coatesville, Pa.; Hosp. Univ. Pennsylvania, Philadelphia): PRECAUTIONS IN THE DETERMINATION OF LEAD IN BIOLOGICAL MATERIAL BY DIPHENYLCARBAZIDE. Analytical Chemistry 25:838-9 (May), 1953.

Experience with the method for determination of Pb in body fluids (Letonoff and Reinhold, 1940, 1941) has indicated that occasional analyses were unsatisfactory due to 1 of 3 causes: (1) losses of precipitate from the use of centrifuge tubes that were asymmetrical or unsuitable for other reasons;

(2) use of ammonium acetate wash solution <7.0 pH; (3) contamination with chromate residues. Proper tubes have been made available recently for the method. A proper wash solution is prepared by dissolving sufficient ammonium acetate (of low Pb content) to make a solution $\sim$1% in water containing 1.5 ml 0.1N ammonium hydroxide/100 ml, filtering, and using at a temperature of $\sim$10°C. To prevent contamination, special care should be taken to remove contaminants from tubes, stirring rods, stoppers, etc, before proceeding with color development. Thorough cleaning of working area, equipment, and analysts' hands is also necessary after the mother liquor from the precipitate has been decanted and discarded.

3625 Muller, L. (Inst. Legal and Soc. Med., Strasbourg, France): Précisions sur la recherche des hématies à granulations basophiles du saturnisme. (IMPROVEMENTS IN THE STUDY OF BASOPHILIC STIPPLING OF ERYTHROCYTES IN LEAD POISONING.) Archives des Maladies Professionnelles de Médecine du Travail et de Sécurité Sociale 14:147-8, 1953.

Because of the following causes, many slides prepared for stippled cell counts were found to be unsuitable: the fixation time was too long; the distilled water contained carbon dioxide; poorly-prepared smears. To avoid these, the author suggested measuring the fixation time with a chronometer and limiting it to 3 min, boiling the distilled water for 5-10 min, and preparing smears according to the Manson method, modified as follows: (1) Use very clean slides, washed with alcohol; (2) Make smears as thin as possible, dry quickly; (3) Immerse slide in methyl alcohol for 3 min; (4) Dry for 5 min; (5) Prepare staining mixture as follows: Solution I: methylene blue, 1 g; boric acid, 2 g; boiled distilled water, 100 ml. Solution II: Na hydroxide (Codex) 0.28 g; boiled distilled water, 100 ml. Mix the 2 solutions at the last moment, just before use, at the rate of 6 drops of solution I and 8 of solution II. Add 30 ml double distilled water; the stain should be transparent. (6) Dip the slide for 10-15 sec into the stain; (7) plunge it immediately in boiled distilled water for washing; (8) dry in air.

3626 Valentin, J., Stehwien, D., and Fürtig, W. (Univ. Greifswald, Germany): (DETERMINATIONS OF THE HEAVY METAL IONS WITH ORGANIC SULFUR-COMPOUNDS. I. USE OF THIOACETAMIDE AS QUANTITATIVE PRECIPITANT FOR MERCURY AND LEAD SALT SOLUTIONS AND A SIMPLE LIMIT DETERMINATION METHOD FOR DETERMINING LEAD CONTENT IN PHARMACEUTICAL PREPARATIONS.) Pharmazie 8:638-42, 1953; Chemical Abstracts 50:17327, 1956.

3627 Woessner, W.W., and Cholak, J. (E.I. du Pont de Nemours & Co., Penns Grove, N.J.; Univ. Cincinnati, O.): IMPROVEMENTS IN THE RAPID SCREENING METHOD FOR LEAD IN URINE. A.M.A. Archives of Industrial Hygiene and Occupational Medicine 7:249-54 (Mar.), 1953.

Experience gained in the application of the rapid screening test (Cholak et al, 1948) has led to a number of revisions which greatly improve its reliability and convenience, not only in monitoring personnel exposed to inorganic Pb, but also those exposed to organic Pb. The discrepancies between the findings by the old and the new method are indicated in a table. In this technique, designed to be applied directly to freshly voided urine, for workers exposed to organic Pb conversion to inorganic forms is by iodine (I). The conversion procedure, which precedes the cited technique, includes placing a 40 ml sample in a centrifuge tube, adding 1.5 ml I solution (150 mg KI in H_2O, making acid to Congo red paper with 1:1 HNO_3, adding 75 g I, and making up to 250 ml), mixing, heating 15 min at 80-85°, cooling to 20-25°, adding 1 mg Na_2SO_3 (20 g in 100 ml distilled H_2O), and mixing. Following addition of dithizone, measurement is by photometer. Bi, Ti, and Sn interfere. Applied for $\sim$2 yr, the new revised method proved to be practical for the appraisal of the severity of the exposure of the TEL-exposed workers.

1954

3628 Amdur, M.O., and Silverman, L. (Harvard School of Public Health, Boston, Mass.): DIRECT FIELD DETERMINATION OF LEAD IN AIR. A.M.A. Archives of Industrial Hygiene and Occupational Medicine 10:152-7 (Aug.), 1954.

A method is described for detecting airborne Pb particles, designed to be quantitatively adequate, simple, and suitable for use as a direct field test. The test requires 2 reagents, a 0.2% solution of tetrahydroxyquinone in 95% ethanol and a buffer solution of pH 2.79. For field use the method would make the use of the hand-pump sampler possible, or a small filter-paper holder in conjunction with a small sample pump; 2 dropping bottles containing the reagents, a support for the paper, a blotter, and a set of color standards would be required. Other metals as well as Pb give color reactions with tetrahydroxyquinone; the number of these interfering metals is greatly reduced by the buffer solution, and Cd is the only one left to give serious interference.

3629 Anatasi, A., Mercarelli, E., and Novacic, J. (Farmitalia, Milan, Italy): (POLAROGRAPHIC DETERMINATION OF TRACES OF COPPER, LEAD, ZINC, AND IRON IN GLASS USED FOR PHARMACY.) Boll. chim. farm. 93:239-47, 1954; Chemical Abstracts 48:11727, 1954.

3630 Avrutova, Kh.Z., Privalova, K.P., and Khlopin, N.Ya. (Molotov Pharmaceutic Inst., USSR): Izvlechenie malykh kontsentratsii tetraetilsvintsa iz vozdukha. (REMOVAL OF SMALL AMOUNTS OF TETRAETHYL LEAD FROM AIR.) Gigiena i Sanitariya 1954, No. 3:50-1.

A satisfactory method for extracting small concentrations of TEL in air sampling, is to absorb the substance in a solution of 11.066 g K iodide and 16.93 g I in 100 ml water contained in a train of 3 absorption bulbs. The real determination is then run polarographically in 2N K chloride.

3631 Bennett, H. (British Ceramic Res. Assoc.):

THE SOLUBILITY OF LEAD GLAZES. PART V. CHEMICAL FACTORS AFFECTING SOLUBILITY DETERMINATIONS. Transactions of the British Ceramic Society 53:203-17, 1954.

Details are given of a method for Pb solubility determination, by precipitation of Pb as sulfide, followed by determination as chromate. The results of an investigation into its usefulness with pure solutions and glazes is included. The contamination of the Pb chromate precipitate when the Pb is determined directly as chromate is also investigated. A survey shows that at least half the glazes yield contaminated Pb chromate precipitates. Analysis of these show that silica is the main contaminant and occasionally metals of group III and Ba cause some difficulty.

3632 Bionda, G. (Univ. Turin, Italy): (DETERMINATION OF LEAD IN ADDITIVES AND IN MINERAL OILS BY THE DISODIUM SALT OF ETHYENEDIAMINETETRAACETIC ACID.) Atti accad. sci. Torino Classe sci. fis., mat. e nat. 88: 195-8, 1953-4; Chemical Abstracts 49:6024, 1955.

3633 Butt, E.M., Nusbaum, R.E., Gilmour, T.C., and Di Dio, S.L. (Los Angeles Co. Hosp.; Univ. S. California School Med.; Univ. California, Los Angeles): THE USE OF EMISSION SPECTROGRAPH FOR STUDY OF INORGANIC ELEMENTS IN HUMAN TISSUES. American Journal of Clinical Pathology 24:385-94, 1954.

The spectrographic results for Cu, Zn, Fe, Mn were found to be reproducible. The average values in the following tissues for Pb in mg/100 g tissue were: liver: 0.517; kidney: 0.0362; heart: 0.195: brain: 0.082; lung: 0.234; spleen: 0.275. The standard error ranged from 0.008-0.70. A knowledge of metal contents and storage values may be useful in the study of enzyme systems.

3634 Calabro, F. (Univ. Naples, Italy): (IDENTIFICATION OF LEAD AND MERCURY IN THE URINE.) Folia med. (Naples) 37:1095-1100, 1954

Pb is identified with diphenylthiocarbazide which gives a yellow color at pH 7, but does not react in an alkaline medium. (From Chemical Abstracts 49:7631, 1955)

3635 Cornish, P.E., and Shiels, D.O. (Ind. Hyg. Div. Dept. Health, Victoria, Australia): A SIMPLE MICROMETHOD FOR THE DETERMINATION OF LEAD IN SMALL AMOUNTS OF BLOOD. British Journal of Industrial Medicine 11:156-8 (Apr.), 1954.

Pb is determined in 0.5 ml blood (obtained by finger prick) by wet oxidation of the organic matter in the blood followed by determination of the Pb by the mixed-color dithizone method. All manipulations are carried out in 1 vessel, and no expensive apparatus is required. Five determinations can be done in 3 hr. Results are accurate enough for clinical purposes, the average percentage recovery for all amounts of Pb equal to or $>$0.10 mg/100 g blood being 98.64 ± 2.4, and the average percentage recovery for all values (2) 103.63 ± 3.10. Bi or Tl if present, would interfere.

3636 Elvidge, D.A., and Garratt, D.C. (Boots Pure Drug Co., Ltd., Nottingham, England): A NOTE ON A BOMB TECHNIQUE FOR PREPARING SAMPLES FOR DETERMINATION OF LEAD IN FOODSTUFFS. Analyst 79:146-7; discussion 147-9, 1954.

Ignition by a spark in a small Ni bomb filled with O has proved satisfactory for burning foodstuffs prior to determining Pb by any suitable technique.

3637 Ferrett, D.J., Milner, G.W.C., and Smales, A.A. (Atomic Energy Res. Est., Hartwell, England): THE DETERMINATION OF LEAD IN COCOA WITH SQUARE-WAVE POLAROGRAPH. Analyst 79:731-4 (Dec.), 1954.

The rapid determination of $<$1 ppm Pb in a sample of cocoa is described. The residues produced when 2-3-g samples of cocoa are ashed at 500° C are dissolved in HCl and the Pb in the solution is determined directly by means of a square-wave polarograph. The blanks in this procedure are equivalent to $\leq$0.005 ppm Pb. Although the blanks are greater when 0.5-g samples of cocoa are wet oxidized with nitric and perchloric acid, the results confirm those determined by the dry-ashing method.

3638 Graziani, G., Fusco, M., and Rossi, L. (Univ. Naples, Italy): (DETERMINATION OF LEAD IN THE BLOOD WITH THE SPECTROPHOTOMETER OF BECKMAN.) Folia Med. (Naples) 37:637-42, 1954.

The organic matter of the blood was destroyed with nitric and sulfuric acids. After reduction of Fe present with hydroxylamine-hydrochloride, the solution (pH 8.5-9.0) was shaken with a solution of dithizone in C disulfide. The red color was measured at 520 mμ. (From Chemical Abstracts 49: 1858, 1955)

3639 Hunold, G.A. (Berlin, Germany): Porphyrinbestimmung im Urin von Bleiarbeitern. (DETERMINATION OF PORPHYRIN IN THE URINE OF LEAD WORKERS.) Zentralblatt für Arbeitsmedizin und Arbeitsschutz 4:14 (Jan.), 1954.

In order to detect the danger of Pb intoxication early and in a relatively simple manner, the author developed an apparatus with which routine examinations of the urine could be carried out. He made use of the fluorescent property of porphyrin. The results obtained with it were ~10 times higher than are generally reported. The author suggests that additional determinations of porphyrin in the urine of Pb workers be made with this apparatus to see whether this fluorescence method is suitable for the differentiation of normal from pathologic coproporphyrin levels.

3640 Isshiki, T., Mashkio, Y., and Tsukagoshi, S. (Univ. Tokyo, Japan): DERIVATIVE POLAROGRAPHY. II. DERIVATIVE POLAROGRAPHY OF CADMIUM, ANTIMONY, AND LEAD IONS. Pharm. Bull. (Tokyo) 2:263-5, 1954; Chemical Abstracts 49:14530, 1955.

3641 Kahle, G., and Reif, E. (Rudolf-Virchow Hosp., Berlin, Germany): Die Bestimmung von Kupfer, Blei und Zink im Blutplasma unter Anwendung der Polarographie und des

Kationenaustauschers. (DETERMINATION OF COPPER, LEAD, AND ZINC IN BLOOD PLASMAS WITH THE AID OF THE POLAROGRAPH AND CATION EXCHANGERS.) Biochemische Zeitschrift 325:380-8, 1954.

Two procedures were followed. Either the plasma or serum is wet ashed and subjected to a cation exchange by filtration through a column of Wofatite, or the elements are isolated by means of cation exchange. Evidence was established that under the same conditions the results achieved by either procedure are equal.

3642 Khosla, B.D., Gaur, H.C., and Ramaiah, N.A. (Univ. Delhi, India): VOLTAMMETRIC ESTIMATION OF LEAD WITH POTASSIUM FERROCYANIDE. Current Science (Bangalor, India) 23:361 (Nov.), 1954.

Pb^{++}, at a concentration of 0.001-0.008M, was titrated with 0.025-0.100M K ferrocyanide at the dropping Hg electrode at -0.55 v vs the saturated calomel electrode. The supporting electrolyte was 0.1M K nitrate and gelatin was used as a maximum suppressor at a concentration of 0.0005%. Ba and Ca did not interfere. (From Chemical Abstracts 49:6025, 1955)

3643 Lockwood, H.C. (Cadbury Bros. Ltd., Birmingham, England): DETERMINATION OF LEAD IN FOODSTUFFS. Analyst 79:143-6 (March), 1954.

A method for the determination of Pb in foodstuffs, based on extraction of the dissolved ash with a solution of diethylammonium diethyldithiocarbamate in CCl, at a pH 7.0, is suggested. The complex is decomposed with acids and the Pb is determined by extractive titration with a 0.0035% solution of dithizone in chloroform.

The method is more accurate than the usual sulfide technique and more convenient than the absorptiometric method with dithizone solutions.

3644 Maltby, J.G. (Distillers Co., Ltd., Great Burgh, England): A POSSIBLE SOURCE OF ERROR IN THE DETERMINATION OF TRACE METALS, PARTICULARLY LEAD. Analyst 79:786-7 (Dec.), 1954.

The enamel used in the graduation marks on pipets in England sometimes contains Pb. Therefore all the enamel has been removed by appropriate solvents in order to avoid contamination of Pb-free solutions, which might have led to some peculiar results.

3645 Marple, T.L., and Rogers, L.B. (Massachusetts Inst. Technol., Cambridge): COULOMETRIC AND POLAROGRAPHIC DETERMINATIONS OF TRACE AMOUNTS OF LEAD. Analytica Chemica Acta 11:574-85, 1954.

A stationary Hg-plated Pt electrode in a rapidly stirred solution has been applied to the polarographic coulometric determination of traces of Pb^{++}. Once the equipment has been assembled and calibrated, analyses of micromolar solutions can be completed in <10 min each, with a precision of ±5%. The method avoids the lengthy preparation of reagent solutions and the tedious extractions encountered in the competitive dithizone procedure. Furthermore, it can handle more diluted solutions than those usually analyzed by dithizone (ie, as low as 10^{-8}M). (From authors' summary)

3646 Mokranjac, M., and Jovanović, D.: (POLAROGRAPHIC DETERMINATION OF LEAD IN AIR.) Acta Pharm. Jugoslav. 4:52-61, 1954.

A measured amount of air is pumped through a 4% HNO_3 solution which is then evaporated. The residue is dissolved in 1:1 $HClO_4$-HNO_3 and again evaporated to dryness. If this material contains Fe, it is dissolved in 6N HCl and extracted with ether. The HCl solution is then evaporated and the residue dissolved in 2 ml of citrate buffer, pH 4.0, Cd ion is added, and the solution analyzed polarographically. (From Chemical Abstracts 49:2250, 1955)

3647 Mokranjac, St.M., and Radmić, S.: (DETERMINATION OF LEAD IN BLOOD.) Acta Pharm. Jugoslav. 3:253-62, 1954.

A modified method for Pb determination in blood by dithizone is described. Blood is digested with nitric acid, hydrogen peroxide, and 0.25 ml sulfuric acid, Fe being removed with ethyl ether (ethyl oxide). The accuracy is within 1.1-4.3% with blood containing 1-200 µg Pb/100 ml. (From Chemical Abstracts 48:10099, 1954)

3648 Morozov, V.A. (F.F. Erisman San. Res. Inst., Moscow, USSR): COLORIMETRIC DETERMINATION OF LEAD IN ATMOSPHERIC AIR. Gigiena i Sanitariya 1954, No. 9:46. In Levine, B.S.: U.S.S.R. Literature on Air Pollution and Related Occupational Diseases. Washington, U.S. Department of Commerce, Office of Technical Services, 1962, Vol. 7, pp. 93-4.

A colorimetric method using quinalizarin for the determination of Pb in the atmosphere is described. Air samples in the proximity of a metallurgical plant and in industrial emissions were found to contain 0.05-2.75 µg Pb/m^3 of air. (Translation of the same article appears also in Vol. 3, 1960, pp. 27-8.)

3649 Nylander, A.-L., and Holmquist, C.-E. (Dept. Ind. Hyg., Natl. Inst. Public Health, Stockholm, Sweden): POLAROGRAPHIC DETERMINATION OF LEAD IN BLOOD. A.M.A. Archives of Industrial Hygiene and Occupational Medicine 10:183-91 (Sept.), 1954.

The method described may be considered to be specific for Pb and to have adequate accuracy. The sensitivity of the method may possibly be increased by using multiple electrodes, according to Valentinuzzi (1951).

A table is included of blood Pb values obtained by the method described and compared with analyses of the same samples by a spectrographic method. (17 references)

3650 Pribil, R., Cihalík, J., Dolezal, J., Simon, V., and Zýka, J. (Univ. Prague, Czechoslovakia): (COMPLEXOMETRIC TITRATIONS IN PHARMACEUTICAL ANALYSIS. VII. DETERMINATION OF LEAD.) Ceskoslov. farm. 3:84-5 (1954).

In the method discussed, 50 mg of sample is dissolved in 5 ml 0.1M complexon III (boil when needed), diluted to 20 ml with water, 5 ml buffer solution pH 10 (ammonia and ammonium chloride) and Erichrome Black T as indicator (mixture 1:200 with Na chloride) added; and the solution titrated with 0.1M zinc sulfate. (From Chemical Abstracts 15478, 1959)

3651 Proctor, C.D., and Oester, Y.T. (Stritch School Med.; Grad. School, Loyola Univ., Chicago, Ill.): APPLICATIONS OF POLAROGRAPHY TO ANALYTICAL TOXICOLOGY. II. APPLICATIONS OF POLAROGRAPHY TO THE PROBLEM OF PLUMBISM. Journal of Forensic Medicine 1:301-13 (July-Sept.), 1954.

A method for the polarographic determination of Pb in biological material was presented and evaluated both on the basis of its quantitative validity and on the basis of its usefulness. The method was found to be comparable in accuracy to the dithizone method and less time consuming.

Polarographic "in vitro" studies of the effect of agents used in the chemotherapy of chronic Pb poisoning on the extent of Pb ionization in the plasma showed that BAL, K iodide and ammonium chloride increased the extent of Pb ionization in the plasma, that Ca chloride caused little if any change, while disodium hydrogen phosphate caused a marked depression. The authors consider that these results furnish insight into the possible mechanism by which disodium hydrogen phosphate effects detoxification of Pb in vivo and lend support to the theories concerning this mechanism. The Pb levels found by polarographic analysis on the 24-hr urine samples from persons with normal and abnormal exposure to Pb in the Chicago area coincide with the ranges established by Gant using the dithizone method for a similar study. It is demonstrated that this method for Pb analysis adequately covers the concentration range encountered in industrial toxicological surveys for Pb. (From authors' summary; 19 references)

3652 Ryan, E.J., and Morgan, J.L. (Emporia, Kans.): THE URINARY PORPHYRIN TEST IN DETECTION OF LEAD ABSORPTION. Proceedings of the Central Society for Clinical Research. Journal of Laboratory and Clinical Medicine 44:921, 1954.

The erythrocyte basophilic stipple count has been proved to be a valuable laboratory aid in detecting Pb absorption. More recently the detection of urinary porphyrins (UP), a simple procedure, has been advocated as a more sensitive screening test. In comparing the merits of the stipple count (SC) and the UP test, it was demonstrated that the UV light source was a most important variable in the results obtained with the porphyrin test. Employing a Hg lamp with a blue-purple ultra filter and a core and coil ballast and using the method of McCord slightly modified, comparisons were made with the SC in 67 consecutive tests on battery factory workers. In these 67 tests, there were 29 which showed SC and 45 positive UP tests. There were 4 instances where SC were seen accompanied by negative porphyrin tests. On the other hand, there were 21 positive porphyrin tests when no SC were present. From these figures, it seems probable that the detection of UP, employing a suitable UV light source, is a more sensitive procedure than the count of SC in the detection of Pb absorption.

3653 Society for Analytical Chemistry, Analytical Methods Committee: THE DETERMINATION OF LEAD IN FOODSTUFFS. Report of the Lead Panel of the Metallic Impurities in Foodstuffs Sub-Committee. Analyst 79:397-402 (July), 1954.

The Committee recommends the use of the mono-color technique for the assessment of Pb in foodstuffs. An assessment can additionally be made with a tintometer or even by nesslering. The results of tests made on cocoa and syrup are shown in tables. The Committee expresses the hope that the method will be tried extensively and that further work will confirm it as a standard or referee method.

3654 Suzuki, S., Ishizawa, M., and Maeda, H. (Tokushima Univ., Japan): (POLAROGRAPHIC DETERMINATION OF LEAD IN URINE.) Igaku to Seibutsugaku (Med. and Biol.) 32:309-11, 1954.

An aliquot of fresh urine (50 cc) was treated with 1 cc of a precipitating reagent and 0.2-0.3 cc concentrated ammonium hydroxide. After centrifuging and washing, the precipitate formed was dissolved in 0.3-0.4 cc concentrated hydrochloric acid. The solution was diluted to 3.0 cc with distilled water and then deoxygenated with a stream of H gas for 15-20 min. The deoxygenated solution was used in the polarographic determination of Pb. The Pb content of urine was determined from a calibration curve prepared with standard solutions of Pb nitrate. (From Chemical Abstracts 50:9495, 1956)

3655 Suzutani, T., and Kanno, I.: STUDY ON DETERMINATION-ERROR IN MICRO-ANALYSIS OF LEAD ON SAMPLES TAKEN FROM BIOLOGICAL MATERIALS. Report 1. LEAD CONTENT IN SODIUM CITRATE FOR BLOOD ANTI-COAGULATION. J. Kyoto Prefect. Med. Univ. 55:17 (English summary), 1954.

The authors point to the danger of Pb contamination in Pb analyses of blood samples for which Na citrate had been used as anticoagulant. This chemical, available commercially, can contain considerable amounts of Pb. It is recommended that all chemicals be tested for their Pb content before use. (From Deutsche Zeitschrift für die Gesamte Gerichtliche Medizin 44:299 (Abstracts), 1955)

3656 Teisinger, J. (Inst. Ind. Hyg. Occup. Dis., Prague, Czechoslovakia): Polyarograficheskii metod opredeleniya svintsa v krovi i ego klinicheskoe znachenie. (POLAROGRAPHIC METHOD OF DETERMINATION OF LEAD IN THE BLOOD AND ITS CLINICAL SIGNIFICNANCE.) Gigiena i Sanitariya 1954, No. 8:28-31.

The author briefly compares various methods for determination of Pb in blood and describes the polarographic method he developed and its modifications. The method is always accurate, rapid, sensitive, and gives reproducible results; it requires little blood and few reagents. The normal level of Pb is <0.07 mg/ml while amounts >0.1 mg/ml are considered pathological. Determination of Pb in urine is much more complicated because of diurnal variations in urine volume and difficulty of 24-hr collections. It is for this reason that the author prefers determination of Pb in blood.

3657 Zurlo, N., and Meschia, G. (Univ. Milan, Italy): Microdeterminazione titrimetrica del piombo con ditizone nell'aria e nei materiali biologici. (MICRODETERMINATION OF LEAD IN AIR AND IN BIOLOGICAL MATERIALS BY THE TITRATION PROCEDURE.) Medicina del Lavoro 45:668-74 (Dec.), 1954.

The dithizone titration was used in the method described. In order to eliminate certain difficulties, the organic substance present in the sample is destroyed by wet ashing with HNO_3. The residue is taken up with HCl (1:1); following addition of NH_2OH, KCN and Na citrate, the solution is taken up with NH_3 (pH 9-10) and from this solution, Pb is extracted with dithizone dissolved in chloroform. Dithizone, which in this solution is bound with Pb, is freed by a 1% solution of HCl and then titrated with a solution containing 5 mg/l of $Pb(NO_3)_2$.

Aside from the time required for ashing, the determination takes <15 min and can be carried out on 50 ml urine or 5 ml blood of normal persons; this can be reduced to 25 and 3 ml for individuals with Pb poisoning. For air analyses, 20 l. suffice. The sensitivity of the method permits the determination of 3-4 µg Pb with an error of ±3%. (18 references)

1955

3658 Alekseeva, M.V. (F.F. Erisman State Central Sci.-Res. San. Inst.): METHODS FOR THE DETERMINATION OF ATMOSPHERIC POLLUTANTS. In Ryazanov, V.A., ed.: Limits of Allowable Concentrations of Atmospheric Pollutants, Book 2, Moscow, Medgiz, 1955, translated by B.S. Levine, Washington, U.S. Department of Commerce, Office of Technical Services, 1959, pp. 84-130.

The author describes some sensitive methods, approved of by the Special Committee of Methods for the Determination of Atmospheric Pollution, which determine concentrations of 10th-100th mg pollutants/m^3 of air. Among the methods described is the colorimetric method for Pb, using quinalizarin reagent. The method is sensitive to 0.05 µg/2 ml.

3659 American Public Health Association, Committee on Chemical Procedures of the Occupational Health Section, Subcommittee on Determination of Lead in Air, R.R. Sayers, Chairman; J. Cholak, G.S. Winn: METHODS FOR DETERMINING LEAD IN AIR AND IN BIOLOGICAL MATERIALS. New York, 1955, 69 pp.

The 1st edition was prepared by a sub-committee of the Industrial Hygiene Section of the American Public Health Association in 1944. The present edition "represents the united thinking of the Committee on Chemical Procedures, Industrial Hygiene Section." It is a complete revision of the original manual, expresses current theory and knowledge and outlines the laboratory procedures "believed to present the most modern methods, equipment and materials generally available."

There are 7 sections. A short introductory section refers to analysis by chemical and physical procedures and the choice of method. The proper collection of samples is then described at some length with stress on the precautions which the analyst must take to secure a fair and accurate result. A section deals with the preparation of samples for analysis by ignition or wet ashing of biological materials such as urine, blood, feces and tissues; of individual and mixed foods; of air samples and dust and of pharmaceutical chemicals. The recommended procedures of analysis are: (1) dithizone methods which are the only chemical methods considered since they are regarded to be the most accurate and capable of modification for particular purposes; (2) physical methods of spectrography and polarography. These types of analysis are all described in detail with suitable reference to principles, equipment and apparatus. A selected bibliography completes the publication.

3660 Balle-Helaers, E., and de Paduwa, G.: Dosage simple et rapide du plomb (dans le sérum et la salive) par polarographie, apres surcharge optimale. (THE SIMPLE AND RAPID DETECTION BY POLAROGRAPHY OF LEAD - IN SERUM AND IN SALIVA - AFTER AN OPTIMUM SURCHARGE.) Arch. Belges Méd. Sociale, Hyg., Méd. du Travail et Méd. Legale 13: 26-32 (Jan.), 1955.

Polarography, being a simple, direct way of determining Pb in serum, is made more sensitive by surcharging the serum with an optimum dose of Pb. The authors give the method and some results and explain the technique. The polarographic wave for Pb is well determined for concentrations of 5-8000 µg Pb/1000 cc or 1 in a million (sic). Advantages of the method are simplicity, objectivity, specificity, and exactitude not obtained by the usual tests for Pb in blood and urine. (From Bulletin of Hygiene 30:879, 1955)

3661 Bessman, S.P., and Layne, E.C., Jr. (Children's Hosp., Washington, D.C.): A RAPID PROCEDURE FOR THE DETERMINATION OF LEAD IN BLOOD OR URINE IN THE PRESENCE OF ORGANIC CHELATING AGENTS. Journal of Laboratory and Clinical Medicine 45:159-66, 1955.

A simplified procedure for the determination of Pb in small samples of urine and blood by the dithizone method is reported. The entire determination is performed in a glass-stoppered digestion tube. Resin deionized water is used in place of glass redistilled water. The agreement between duplicate determinations on urine is 3.86 ± 2.61%, and between duplicate blood levels 7.45 ± 4.20%. CaEDTA at levels equivalent to 500 mg% in urine and 2,500 mg% in blood does not interfere. (From authors' summary)

3662 Buttlar, H.V.: Bleianalyse nach der Isotopenverdünnungsmethode mit Ra D als Träger. (LEAD ANALYSIS USING THE ISOTOPE DILUTION METHOD WITH Ra D AS CARRIER.) Naturwissenschaften 42:90, 1955.

The principle of this method which can be carried out only by specially equipped physical institutes is as follows: an unknown quantity of some µg of

Pb is combined with a known quantity of some ^{210}Pb (RaD) and the mixture is subjected to isotope separation or isotope analysis by using a mass spectrometer or an interferometer apparatus. A few tenths of µg of Pb may be determined with a correctness of 10-20%. (From Zentralblatt für Arbeitsmedizin und Arbeitsschutz 8:68, 1958)

3663 Cimerman, Ch., and Bogin, D. (Israel Inst. Technol., Haifa): MICROGRAVIMETRIC DETERMINATION OF LEAD WITH MERCAPTOBENZOTHIAZOLE. Analytica Chimica Acta 12:218-26, 1955.

The Spacu and Kuras macrogravimetric determination of Pb with mercaptobenzothiazole (MBTh) was adapted to a microtechnique.

A 76%-180% excess of a 1% solution of MBTh in 2.5% NH_4OH is the precipitating agent. This is added, with stirring, to a beaker mounted in a water bath containing the unknown. The precipitate is washed with 4-8 ml of 2.5% NH_4OH. The washings are tested until no excess MBTh is determined. The beaker and filter stick are dried at 110° under low suction. They are air cooled for 25 min while still under suction and then weighed. Specific details are given. The maximum relative error is ±0.3% for the range of 3-8 mg of Pb.

3664 Ehrenberg, H.F., Geiss, J., and Taubert, R.: (A HIGH-PRECISION MASS SPECTROMETER FOR LEAD ISOTOPE ANALYSES.) Z. Angew. Phys. 7:416-23, 1955.

Construction details are given for a simple-focussing all-metal 60° sectored-field mass spectrometer for measurement of Pb isotope abundances. Obtainable accuracy is 0.2%. Measurement of ion current is done in a novel way. (From Chemical Abstracts 50:4561, 1956)

3665 Hammond, P.B.: A SIMPLIFIED LABORATORY PROCEDURE FOR THE DIAGNOSIS OF LEAD POISONING IN CATTLE. Dissertation, University of Minnesota, 1955, 171 pp.

The analytical procedure developed was a modification of the mixed-color dithizone method which consists of: I, Sample preparation; II, addition of reagents leading to color development; III, color interpretation. All 3 phases were found to be amenable to simplification: I. The usual approach consists of vigorous oxidation of all organic material with strong oxidizing acids and heat. It was found that the same end could be attained by the precipitation of blood and liver proteins with 5% trichloracetic acid. Between 75 and 100% of the Pb known to be present in the blood or liver samples was always recovered in the centrifugates. II. Conventional methods for dithizone determination of Pb require the addition of NH_3 hydroxide, NH_3 citrate, K cyanide, and a chloroform solution of dithizone. Simplification of these additions consisted of the substitution of Na hydroxide and Na carbonate for NH_3 hydroxide (in order to achieve greater reagent stability) and the combining of these and K cyanide into one aqueous solution. It was determined that this aqueous solution was stable for at least 7 mo when stored at room temperature. A dithizone solution of 8 mg/l was used with chloroform as a solvent. This solution was found to be stable for 5-6 mo when stored in a refrigerator. III. Most conventional dithizone procedures require the use of either a colorimeter or a spectrophotometer as a means of translating color into Pb concentration. This phase was simplified by the use of a series of color cards, each representing a specific concentration of Pb.

For results obtained on normal and poisoned cattle, see Abstract No. 675.

3666 Hoschek, R. (Stuttgart, Germany): Halbquantitative Porphyrin-Schnellbestimmung für werksärztliche Reihenuntersuchungen. (RAPID SEMIQUANTITATIVE DETERMINATION OF PORPHYRIN IN MASS EXAMINATIONS IN INDUSTRIAL HYGIENE.) Zentralblatt für Arbeitsmedizin und Arbeitsschutz 5:163-5 (Sept.), 1955.

A new rapid method for the detection and semiquantitative determination of porphyrin in urine is described. The method which is based on the fluorescence of porphyrins, is suitable for routine tests of workers exposed to Pb. Extraction of porphyrins from the urine is not necessary. Interfering fluorescences are eliminated by a simple coupling reaction using Ehrlich's aldehyde reagent, and addition of Na hyposulfite. As little as 10 µg% porphyrin can be detected. The time required is ~1-2 min/determination. The findings by this method compare very well with the clinical findings as well as with the traditional methods. They are also much better than the spectroscopic method with which only values of >50 µg% could be detected.

3667 Hoschek, R., and Pfeilsticker, K. (Stuttgart, Germany): (INCORRECT VALUES FOR BLOOD-LEAD CONCENTRATION.) Deut. med. Wochschr. 80:1187-8, 1955.

Collection of blood samples by using syringes fabricated with Pb-containing solder resulted in false high values for blood-Pb concentration. (From Chemical Abstracts 50:426, 1956)

3668 Jensen, R.: Microdosage du plomb dans le sang par polarographie. (MICROCHEMICAL DETERMINATION OF LEAD IN BLOOD BY POLAROGRAPHY.) Chimie Analytique 37:53-5, 1955.

In the method described, the organic matter is destroyed according to Sandell (1950); the solution is neutralized with ammonium hydroxide and 1 ml of 5% Na diethyldithiocarbamate added. Complexes formed and excess reagent are extracted with chloroform, agitating the separated chloroform with Cu sulfate followed by treatment with HCl. After complete dessication of 5 ml blood mixed with 1 ml of 50% Mg nitrate, the mixture is calcined, cooled, and mixed with 1 ml water and 1 ml concentrated HCl. For determination, add 3 ml of double distilled water, 1 ml of 20% hydroxylamine-HCl, heat to boiling, add 4-5 drops of 50% HCl, and cool; add 1 ml concentrated HCl and 0.5 ml of 1% (carboxymethyl) cellulose as inhibitor of the maximum. The polarogram is traced between -0.3 and -0.6 v.

3669 Johnson, E.I., and Polhill, R.D.A. (Govt. Lab., Strand, London, England): THE USE OF SODIUM HEXAMETAPHOSPHATE IN THE DETERMINATION OF TRACES OF LEAD IN FOOD. Analyst 80:364-7 (May), 1955.

The alkaline-earth phosphates, including Mg-phosphate, can be kept in solution under conditions suitable for dithizone extraction of Pb, by adding Na hexametaphosphate. This facilitates the use of a simple dithizone purification step in the determination of traces of Pb in a wide range of foods. A detailed procedure is given for determining traces of Pb in foods but the only new feature is the use of the metaphosphate to prevent or delay the precipitation of $MgNH_4.6H_2O$.

3670 Kumler, K., and Schreiber, T.P. (General Motors Corp., Detroit, Mich.): LEAD IN BLOOD. A RAPID METHOD FOR SPECTROCHEMICAL ANALYSIS. American Industrial Hygiene Association Quarterly 16:296-300 (Dec.), 1955.

By the method described, 30-40 blood samples can be analyzed by 1 person in a day. If necessary, 1 or 2 can be completed in 45 min. This has been accomplished by cutting the time of preparing the sample for the arc ~50% (use of partially oxidized blood); by reducing the spectral background to the point where its measurement is unnecessary. This reduction has been achieved by the use of a narrow slit (10 μ) and N in the analytical gap. Freedom from contamination, necessary for accuracy, is largely due to the electrode loading technique. The accuracy of the method was established by 300 blood analyses with this method and chemically.

3671 LaTorre, P., and Silverman, L. (Harvard School Pub. Health, Boston, Mass.): COLLECTING EFFICIENCIES OF FILTER PAPERS FOR SAMPLING LEAD FUME. A.M.A. Archives of Industrial Health 11:243-50 (Mar.), 1955.

Several commercially available analytical filter papers were tested to determine which are best suited for field sampling of airborne Pb from the standpoint of resistance, efficiency, and uniformity of efficiency. Tests were made with Pb fume produced by 4 different methods comparable with those found in practice. Electron micrographs of these fumes indicated mean sizes in the 0.01-0.05 μ range. Discrete particles as small as 0.005 μ were recognized, but the fields contained large numbers of aggregates, some as large as 0.6 μ. The collecting efficiency of 5 of these papers was >75% and fairly uniform (5% average deviation). For convenience they were placed into 3 resistance groups. The best in the low resistance group (<0.3 in $H_2O/ft^2/cfm$) was Whatman No. 41; in the medium resistance group the best was Munktell No. 00, (0.3-1.0 in $H_2O/ft^2/cfm$); in the high resistance group, Whatman 42 and 44 and HA Millipore (>1.0 in $H_2O/ft^2/cfm$). Collecting efficiency was found to increase with decreasing sampling rate, indicating diffusion as the principal separating force. No effect of fume concentration on efficiency was noted except when high fume loadings were sampled. In these cases, fume was presumed to deposit in the void spaces of the filter media, and efficiency was increased by the filtering action of the deposited aerosol. (30 references; from authors' summary)

3672 McCord, W.M., and Zemp, J.W. (Med. Coll. S. Carolina, Charlestown): DETERMINATION OF LEAD IN URINE. Analytical Chemistry 27:1171-2 (July), 1955.

A method is described for the determination of Pb in urine which eliminates the necessity for time-consuming precipitation and ashing. Pb, as Pb iodide, is extracted quantitatively from acid solution with methyl isopropyl ketone. The Pb is then removed from the ketone layer with an aqueous Na hydroxide solution and is determined colorimetrically by the dithizone method of Snyder (1947) using the Pb-KI separation of Bambach and Burkey (1939). The time required for each analysis is ~45 min. The range of sensitivity of the method, 0.70 μg using a 22-mm cell and a Coleman Universal spectrophotometer, is sufficient to determine the microquantities of Pb found in mild, chronic Pb poisoning which would otherwise be difficult to detect. By varying cell size the range may be increased.

3673 Masui, M., and Sayo, H. (Univ. Osaka, Japan): CONTROLLED-POTENTIAL ELECTROLYSIS. I. COUNTER MICROCOULOMETER AND ITS APPLICATION TO THE DETERMINATION OF COPPER, LEAD AND CADMIUM. J. Pharm. Soc. Japan 75:1515-19, 1955.

By the method described, Cu, Pb, and Cd in μg amounts could be determined with a reproducibility within 0.2%. When the background count was made definite and its ratio to the total count made as small as possible, Cu could be determined within an error of 1 μg. Determination of a mixture of Pb and Cd gave larger error. (From Chemical Abstracts 50:4561, 1956)

3674 Mazza, L., Scotti, E., and Bruno, B.M. (Univ. Genoa, Italy): (POLAROGRAPHIC DETERMINATION OF LEAD IN BLOOD.) Ann. chim. (Rome) 45:797-804, 1955.

By the method described, samples of blood taken from many individuals contained <100 μg/100 ml. (From Chemical Abstracts 50:6560, 1956)

3675 Minami, E., and Sato, G. (Univ. Tokyo, Japan): TITRATION OF A MICROAMOUNT OF LEAD WITH ETHYLENEDIAMINETETRAACETIC ACID (EDTA) WITH DITHIZONE AS AN EXTRACTION INDICATOR. Japan Analyst 4:579-81, 1955.

The title method was described. Since the end point did not coincide with the equivalent point, standardization of EDTA solution in the same condition was necessary. (From Chemical Abstracts 50:16545, 1956)

3676 Mokranjac, M.S., and Jovanovic, D.A.: (PROBLEM OF POLAROGRAPHIC DETERMINATION OF LEAD IN FOOD.) Vojnosanit. Pregled 12: 583-7, 1955.

HNO_3, HCl, $ZnSO_4$, Na citrate, KOH and thymol blue were used as reagents. Polarograms were recorded between -0.65 and -0.85 v vs the HgCl electrode. (From Chemical Abstracts 50:17224, 1956)

3677 Mukherji, A.K., and Dey, A.K. (Univ. Allahabad, India): COMPLEX CITRATES [illegible] IN INORGANIC ANALYSIS. II. SEPARATION AND ESTIMATION OF SILVER AND LEAD IN A MIXTURE. Zeitschrift für Analytische Chemie 145: 93-6, 195[illegible].

A new procedure is suggested for the quantitative separation of Ag^+ and Pb^{++} in a solution. Add an excess of Na citrate solution which will first cause precipitation of the citrates of Ag and Pb but the precipitations will redissolve as complex citrates. By addition of HCl, AgCl alone precipitates out and can be estimated gravimetrically. Pb can be determined in the filtrate as Pb chromate.

3678 Nedobora, A.F.: (A PRECIPITATION-CHROMATOGRAPHIC METHOD FOR THE DETERMINATION OF LEAD.) Sbornik Stud. Rabot, Moskov. Tekhnol. Inst. Myasnoi i Molochnoi Prom. 1955, No. 3:100-3.

The method as described, is simple and requires only a small quantity of solution (2-4 ml). The time for a determination is 15-20 min. (From Chemical Abstracts 54:12892, 1960)

3679 Opalko, S. (Centralny Inst. Ochrony Pracy, Warsaw, Poland): (DETERMINATION OF LEAD IN AIR BY POLAROGRAPHY.) Prace Centralnego Inst. Ochrony Pracy 4, No. 3(13):34-8, 1955.

Air was passed through an absorber containing sugar or glass wool. The material was boiled in HNO_3 and Pb was determined in the usual way. (From Chemical Abstracts 53:5968, 1959)

3680 Popova, T.P.: (POLAROGRAPHIC DETERMINATION OF LEAD AND ZINC IN NATURAL WATERS.) Sbornik Nauch.-Tekh. Inform., Ministerstva Geol. i Okhrany Nedr. 1955, No. 1:129-30.

To prevent loss of Pb and Zn during storage and the reduction in volume of the sample being transferred for analysis, concentration under field conditions by means of coprecipitation with $CaCO_3$ was made. The precipitation of $CaCO_3$ completely absorbs the Pb. The $Ca(NO_3)_2$ solution resulting from the precipitate was employed as the polarographic background in the determination of Pb. The sensitivity of the method is 0.01-0.02 mg/l. (From Referat. Zhur., Khim. 1956, Abstr. No. 68688; Chemical Abstracts 53:22625, 1959)

3681 Sugihara, K., and Saito, I. (Osaka Ind. Res. Inst., Japan): (POLAROGRAPHIC ANALYSIS OF HEAVY METALS IN REAGENT-GRADE SODIUM CHLORIDE. I. DETERMINATION OF LEAD.) Japan Analyst 4:27-30, 1955.

Polarographic analysis of heavy metals in reagent-grade Na chloride is described. Twenty to 60 μg Pb was determined with a recovery of 95%. (From Chemical Abstracts 50:4704, 1956)

3682 Tamori, K., Suekane, M., Okada, A., Yoshida, Y., Fujii, T., and Yuge, M. (Osaka City Univ., Japan): INDUSTRIAL LEAD POISONING. IX. RAPID MICRODETERMINATION OF LEAD IN THE BLOOD. Igaku to Seibutsugaku 37:151-4, 1955.

For the method described, recovery of added Pb (0.20-1.20 μg Pb) was 95-108%. (From Chemical Abstracts 52:1511, 1958)

3683 Tamori, K., Suekane, M., Okada, A., Yoshida, Y., Fujii, T., and Yuge, M: A RAPID MICRO-DETERMINATION METHOD OF LEAD IN BLOOD. Medicine and Biology (Japan) 37:151-4 (Nov.), 1955. In Contributions from the Department of Preventive Medicine and Public Health, Osaka City University Medical School. Vol. 1, April 1949-March 1959, p. 34.

3684 Weinig, E., Neugebauer, G., and Neugebauer, I.: Polarographische Bleibestimmung in Blut und Harn. (Zugleich ein Beitrag zur Frage des "normalen" Blutbleigehaltes.) (POLAROGRAPHIC DETERMINATION OF LEAD IN BLOOD AND URINE WITH A NOTE ON THE QUESTION OF THE "NORMAL" LEAD CONTENT OF BLOOD.) Archiv für Hygiene und Bakteriologie 139:551-64 (Nov.), 1955.

This paper gives in considerable technical detail the authors' method for the determination of Pb in blood and urine which, it is claimed, gives accurate results with 5 cc samples of blood and 30 cc of urine. The accuracy of the method is stated to be ±10%. The sample is submitted to wet ashing with sulfuric, nitric, and perchloric acids. The ash is extracted with hydrochloric acid and the Pb determined by a polarographic method. Samples of blood from 220 persons, whose histories revealed no contact with Pb, were analyzed, with the following results: In 186 cases, values ranged from 5-30 μg%; in 32, 31-50; in 2, 51-60. Determinations of blood Pb values in 3 persons before and after breakfast showed that in each the amount of Pb was increased after the meal.

3685 Witwicka, J. (Centralny Inst. Ochrony Pracy, Warsaw, Poland): (POLAROGRAPHIC DETERMINATION OF LEAD IN BLOOD. A MODIFICATION OF THE TEISINGER METHOD.) Prace Centralnego Inst. Ochrony Pracy 4, No. 3 (13):24-33, 1955.

The Teisinger method was modified after Pachnerova, Skramovsky and Srbova, and Zagórska. A 1% heparin solution was used in the place of citrate, O from electrolysis was used for saturation before dealbuminization, and the precipitated albumins were separated by centrifugation. (From Chemical Abstracts 53:7300, 1959)

1956

3686 Antisari, O.V.: RESEARCH IN CHEMICAL COMPOSITION OF SOME FORMS OF ATMOSPHERIC PARTICLES. Chicago Univ., Dept. Meteorol., Tech. Note 5, 1956, 48 pp.

Methods for identification of the chemical composition and size of air-borne particles with a specially treated gel are presented, and Pb determination is included in the series of various specific tests. (From Fuel Abstracts 24, Abstr. No. 5629, 1958; Chemical Abstracts 54:25422, 1960)

3687 Bykhovskaya, M.S., and Babina, M.D. (Inst. Ind. Hyg. Occup. Dis., Acad. Med. Sci., USSR): Opredelenie soderzhaniya svintsa, tsinka i talliya v vozdukhe spektrograficheskim metodom. (DETERMINATION OF LEAD, ZINC, AND THALLIUM IN THE AIR BY A SPECTROGRAPHIC METHOD.) Gigiena i Sanitariya 21, No. 7:26-30, 1956.

The authors have established the optimal conditions for the determination of Pb, Tl and Zn by a spectrographic method, which is described. The spectrographic method of estimation of Pb shows no advantage over the chemical, neither as regards sensitivity nor specificity. Tl, Cu and Zn interfere with this estimation. Zn can be estimated spectrographically in the presence of Cu, but as regards sensitivity this method is inferior to the chemical. The authors have developed a spectrographic method for estimating atmospheric Tl. (From authors' summary)

3688 Chmielowski, J., and Myślak, Z. (Inst. Med. Pracy, Zabrze, Poland): THERAPEUTIC AND PROPHYLACTIC ACTION OF CALCIUM VERSENATE IN LEAD POISONING. I. ATTEMPTS TO DETERMINE POLAROGRAPHICALLY BLOOD AND URINE LEAD LEVELS IN THE PRESENCE OF VERSENATE. Med. Pracy 7:181-7, 1956.

Teisinger's method for determining polarographically Pb in serum was adapted for examination of urine acidified with HCl and filtered. Presence of Ca versenate did not interfere with the determinations. the method proved valuable in determining Pb in concentrations >50 ug%; the average error was ±6.5%. (From Chemical Abstracts 53: 18294, 1959)

3689 Cholak, J. (Univ. Cincinnati, O.): ANALYSIS OF EVIDENCE WITH SPECIAL EMPHASIS ON THE DETECTION OF POISONS. Journal of Criminal Law, Criminology and Police Science 47:482-9 (Nov.-Dec.), 1956.

Of the ~1,500,000 deaths which occur in the US each year ~9000 (0.6%) are homicidal and only 45 of these are due directly to the use of poison. Nevertheless, a laboratory investigating crime is kept busy performing tests for the detection of poisons. The mere presence of a poison in an organ is not sufficient to prove that death by poisoning has occurred. Total quantity rather than mere presence and evidence that the amount was sufficient to cause death are important factors.

For analyses, poisons are generally divided into classes according to methods used to isolate them (ie, Pb classified among the heavy metals). Instruments used for detection are: microscope, spectrograph (96 elements, including Pb, can be detected), spectrophotometers, X-ray diffraction apparatus (to determine nature of a compound, ie, Pb acetate), electron microscope, and the polarograph (for identifying metals, including Pb).

3690 Faber, J.S. (Rijksuniv., Groningen, Netherlands): De complexometrische titratie van zink, kwik, lood, aluminium, bismut in geneesmiddelen. (COMPLEXOMETRIC TITRATION OF ZINC, MERCURY, LEAD, ALUMINUM AND BISMUTH IN PHARMACEUTICAL COMPOUNDS.) Pharmaceutisch Weekblad 91:177-89, 1956.

The di-Na ethylenediaminetetraacetate (complexometric) titration of Zn is an excellent procedure. The method is well suited for Pb compounds. (From author's English summary)

3691 Fabre, R., Truhaut, R., and Boudène, C. (Pharm. Coll., Paris, France): Microdosage polarographique du plomb dans les milieux biologiques. (POLAROGRAPHIC MICRODETERMINATION OF LEAD IN BIOLOGICAL MATERIALS.) Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences 243:624-7, 1956.

See Abstract No. 3711.

3692 Holeček, V.: THE DETERMINATION OF COPROPORPHYRIN IN THE URINE I. Pracovní lékarství 8:110-5, 1956.

A method of determining total coproporphyrin (CP) in the urine on a Beckman spectrophotometer was observed for ascertaining the degree of Pb poisoning. The method was simplified for purposes of routine analysis, partly by a single extraction by hydrochloric acid from ethyl acetate extract and determination of the conversion factor, and partly as a rapid, semiquantitative determination with the visual comparison of the intensity of fluorescence with the scale of standard solutions of CP, with a wavelength of excitation radiation of 405 mμ. Radiation of this wavelength can be obtained by filtering the spectrum of Hg lamp through a fluid filter of the Cu-ammonium complex. The difference in the CP values found on extraction with ether and with ethyl acetate is discussed and explained by the easier extraction of the precursor of CP into ethyl acetate. (From Abstracts Prague Institute of Industrial Hygiene and Occupational Diseases, Science Reports 1952-56, p. 63)

3693 Jouy, H. (Central Lab. Anal. Biol. Res., Limoges, France): Les hématies à granulations basophiles: technique de coloration. Interprétation. (ERYTHROCYTES WITH BASOPHILIC GRANULES; STAINING TECHNIQUE, INTERPRETATION.) Revue d'Hématologie (Paris) 11:321-3, 1956.

The staining solution consists of a saturated solution of methylene blue in 95% alcohol, buffered with a distilled water solution of Na and acid veronal. Very thin smears of blood are used, fixed by plunging for 3 min in 90% alcohol, air-dried rapidly, immersed for 20 min in the buffered methylene blue, then washed in distilled water and dried. This method yields a greater number of basophilic erythrocytes than can be obtained with May Grunwald Giemsa stain. The blood smears can be processed the same day or on subsequent days without any marked variation in numbers. Concerning the counting procedure, the author deems it advisable that all hematologists adopt the same notation. He does not consider the reference of the percentage of stippled cells to white cells recommendable; reference should be to 1000 or 1,000,000 red cells. Change of work should be indicated at 2.5 basophilic erythrocytes/1000; Pb poisoning should be suspected at counts >0.5/1000. He also calls attention to a factor that to his knowledge had not even been reported, which is that there is a considerable difference in the percentage of stippled erythrocytes depending on whether counts are made on venous or peripheral blood. As an example, in a Pb founder, 9.8 stippled cells/1000 erythrocytes in venous blood vs 3/1000 in peripheral blood were found. For this reason, the site of blood sampling must be recorded, and it would also be necessary to establish threshold limits for basophils in peripheral blood erythrocytes as well as for those in venous blood.

3694 Kühnen, G.: Bestimmung des staubförmigen Gehaltes an Blei und Bleiverbindungen in der Luft von Arbeitsräumen. (THE DETERMINATION OF THE LEAD AND LEAD COMPOUND DUST CONTENT OF THE AIR IN FACTORIES.) Staub (Düsseldorf). 1956, No. 45:348-53.
A brief summary is given of the chemical and physical methods which are available for the determination of Pb or its compounds in an atmosphere. A method is described for determining Pb dusts in konimeter and thermal precipitator samples from air by the microscopical counting of the numbers and size of the particles of dust.

3695 Lipchinski, A.: A NEW METHOD FOR THE QUALITATIVE DETERMINATION OF LEAD IONS. Godishnik Khim. Tekhnol. Inst. 3, No. 1: 271-8, 1956.
It was found that the precipitation of Pb^{++} with $(NH_4)_2SO_4$ is unsatisfactory in qualitative analysis, since the $PbSO_4$ may fail to precipitate for various reasons, or the precipitate is often not recognized. Precipitation of the Pb^{++} as $PbCrO_4$ in dilute HNO_3 at a pH of 4-6 is suggested. This method allows determination of 14 μg Pb in 1 ml solution. (From Chemical Abstracts 52:11657, 1958)

3696 Mauzerall, D., and Granick, S. (Rockefeller Inst., New York, N.Y.): THE OCCURRENCE AND DETERMINATION OF δ-AMINOLEVULINIC ACID AND PORPHOBILINOGEN IN URINE. Journal of Biological Chemistry 219:435-46, 1956.
Methods which include the use of ion-exchange resins were developed for the quantitative determination of porphobilinogen (PBG) and ALA in urine. PBG is determined colorimetrically with Ehrlich reagent and ALA is determined by condensing it with acetylacetone to form a pyrrole which reacts with a modified Ehrlich reagent. The error of the method is <5% and the limit of detection in a 1-ml sample of urine is 1 μg PBG and 0.5 μg ALA. ALA has been found in high concentrations in the urine of patients with acute porphyria and has also been detected in normal urine. Some of the factors influencing the selection of optimal conditions for the Ehrlich reaction are discussed. (17 references)

3697 Mayer, F.X., and Schweda, P. (Univ. Vienna, Austria): Studien zur quantitativen Bestimmung von Mikrogrammengen Blei. (QUANTITATIVE DETERMINATION OF MICROGRAM QUANTITIES OF LEAD.) Mikrochimica Acta 1956:485-509.
The statements regarding the accurate determination of μg quantities of Pb by means of dithizone and of the reproducibility of the colorimetric one-color methods were reexamined. The various pH relationships which are of significance in the course of the dithizone procedure were established experimentally. The determination of μg quantities of Pb polarographically is discussed. A simple method is given for the determination of Pb in the presence of Fe III. (From authors' English summary; 55 references)

3698 Pfeilsticker, K. (Chemical Res. Dept., City of Stuttgart, Germany): Eine spektrochemische Mikrobestimmung des Bleis in biologischem Material. (SPECTROGRAPHIC DETERMINATION OF LEAD IN BIOLOGICAL MATERIALS.) Mikrochimica Acta 1956:319-33.
If Pb in biological material is accumulated in the ash, it may be determined by means of even an intermediate spectrograph. The greater part of accompanying substances is extracted from the ash with a reagent which leaves Pb and other heavy metals behind undissolved. The enriched ash together with a bonding solution is dried on Al electrodes. A duplicate determination can be carried out with 2 ml blood if the Pb content is of the order of 20 μg/100 ml. (From author's English summary)

3699 Popper, E., Ariton, N., and Popa-Crăciuneanu, R.: (SEMIMICROMETHOD FOR RAPID DETERMINATION OF LEAD.) Acad. rep. Populare Rominae, Filiala Cluj, Studii cercetări chim. 7, No. 1-4:85-8, 1956.
The lower limit of described method is ~200 μg Pb. (From Chemical Abstracts 52:7023, 1958)

3700 Popper, E., Junie, V., and Popa, L.: (NEW MICROMETHOD FOR THE GRAVIMETRIC DETERMINATION OF LEAD. Acad. rep. populare Romîne, Filiala Cluj, Studii cercetări chim. 7, No. 1-4:89-94, 1956.
The method as described was used to determine Pb concentrations as low as 6 μg/ml with an error of ±0.2%. The alkaline and alkaline earth metals do not interfere. (From Chemical Abstracts 52:7023, 1958)

3701 Porretta, A., Capuano, G., and Cultrera, R. (Staz. speriment. conserve aliment., Palermo, Sicily): SPECTROPHOTOMETRICAL DETERMINATION OF LEAD IN FOODSTUFF. Ind. Conserve 31:7-9, 1956.
From the solution of the ashes (containing 5-25 μg Pb) Pb and Bi are extracted with dithizone; the Bi is extracted by repeated treatments with dithizone, and then the Pb with dilute dithizone. The extract obtained is divided into 2 portions, placing 1 directly in the optical cell of the spectrophotometer and the other in an identical cell after shaking 1 min with 1% H_2SO_4. The absorbances of the 2 portions are measured at 620 mμ; the difference between the 2 readings is proportional to the concentration of Pb. (From Chemical Abstracts 50: 17224, 1956)

3702 Stout, P.R., Jones, G.B., and Delwiche, C.C. (Univ. California, Berkeley, Calif.): DETECTION AND MEASUREMENT OF LEAD-212 AND LEAD-214 in ATMOSPHERES. Conference on Radioactive Isotopes in Agriculture, US Atomic Energy Comm. TID-7512, 1956, pp. 323-35.
By passing air through paper filters, radioactive particles (principally ^{214}Pb, ^{212}Pb and their daughters ^{214}Bi, ^{214}Po, ^{212}Bi and ^{212}Po) are captured in sufficient quantity to be measured with standard laboratory counting equipment. The activities of ^{214}Pb, measured after air filtration for ≧3 hr, approach maximal values for given rates or airflow. From data given by the accumulated

activity of filter pads, the curie activity of the atmosphere has been calculated and found to be in reasonable agreement with earlier reports of the ^{222}Rn content of the atmosphere.

3703 Tompsett, S.L. (Northern Gen. Hosp. Edinburgh, Scotland): THE DETERMINATION AND DISTRIBUTION OF LEAD IN HUMAN TISSUES AND EXCRETA. Analyst 81:330-9 (June), 1956.
A method was described in 1935 for the determination of Pb in biological materials. Organic matter was destroyed by ignition, and Pb was separated as the diethyldithiocarbamate in ether and finally measured colorimetrically with dithizone. Subsequent modifications and particularly the use of the reverse procedure in the final colorimetric determination are described. Results are given to illustrate the distribution of Pb in human tissue and excreta for normal subjects and in cases of Pb poisoning and also the effect of medication in such conditions. (From author's summary; 30 references)

3704 Tsao, C.-M., and Liang, P.: PAPER CHROMATOGRAPHIC DETERMINATION OF LEAD AND COPPER IMPURITIES IN DRUGS. Yao Hsüeh Hsüeh Pao 4:339-45, 1956.
The determinations of Pb^{++} and Cu^{++} as impurities in glucose, sulfanilamide, and tincture of valerian were carried out. In glucose samples the average deviation for Pb^{++} was <1 µg and that for Cu^{++} -0.5 µg. The average deviation was greater in tincture of valerian. (From Chemical Abstracts 52:9516, 1958)

3705 Vasyutinskii, A.I. (Pharm. Inst., Odessa, USSR): (DETERMINATION OF LEAD BY p-AMINO-o-HYDROXYBENZOIC ACID.) Nekotorye Voprosy Farmatsii, Sbornik Nauch. Trudov Vyssh. Farm. Ucheb. Zavedenii Ukr. SSR., 1956, 133-6.
A method for determination of Pb by precipitation with p-amino-o-hydroxybenzoic acid with subsequent bromometric determination of the acid is described. Excess Ba, Ca, and Sr do not interfere. (From Chemical Abstracts 53:6897, 1959)

3706 Westgate, M.[illegible], Shurts, R.B., and Adams, E.F.: DETERMINATION OF LEAD IN PAINTS AT THE ONE PERCENT LEVEL. Natl. Paint, Varnish Lacquer Assoc., Sci. Sec., Circ. No. 773:8-17, 1956.
Results of cooperative tests on the determination of Pb in paints tinted with known amounts of Pb chromate (in liquid and dried film form) by a standard chromate method, involving wet-ashing with HNO_3-H_2SO_4, isolation of Pb as $PbSO_4$, and precipitation as $PbCrO_4$, are reported. An improved procedure involving wet-ashing with Caro's acid has been developed. (From Analytical Abstracts 4, Abstr. No. [illegible]59, 1957; Chemical Abstracts 54:12611, 1960)

1957

3707 Abson, D., and Lipscomb, A.G. (John Mackintosh & Sons Ltd., Halifax, England): THE DETERMINATION OF LEAD AND COPPER IN ORGANIC MATERIALS (FOODSTUFFS) BY A DRY-ASHING PROCEDURE. Analyst 82:152-60 (Mar.), 1957.
A method is described for the dry ashing of food materials and the colorimetric determination of Pb and Cu in the solution of the ash obtained. Initial sulfation of the sample before ashing permits the ashing to be carried out up to a temperature of 550°C without loss of Pb or Cu. Ashing is further speeded up by crushing the charred material to a powder, and a suspension of Mg carbonate is used to increase the bulk of small ashes. Interference during the determination of Pb caused by the alkaline-earth phosphates normally present in food materials is overcome by the addition of Na hexametaphosphate solution before neutralization. When large amounts of Ca sulfate are formed, the ash is rendered completely soluble by a preliminary treatment with hot Na carbonate solution.

Results of duplicate determinations by dry-ashing and wet oxidations are listed for the following food products: honey, malt, glacé cherries, jam, milk powder, condensed milk, milk crumb, cocoa powder, gelatin, glyceryl monostearate, wax and chewing-gum base. In the sulfated samples Pb concentrations ranged generally from 0.10-0.48 ppm; glacé cherries contained 0.65, glyceryl monostearate, 1.05; 2 chewing gum bases had contents of 1.10, 1.68, and 0.63 ppm.

3708 Adamović, V.M. (Higij. Inst., Belgrade, Yugoslavia): (A REVIEW ON THE METHODS FOR DETERMINING LEAD IN FOODS.) Tehnika (Belgrade) 12:1713-15, 1957; Chemical Abstracts 52:14481, 1958.

3709 Bonastre, J. (Agron. Sta., Bordeaux, France): Méthode colorimétrique de microdosage du plomb dans le aliments. (COLORIMETRIC MICRODETERMINATION OF LEAD IN FOOD.) Chimie Analytique 39:104-5, 1957.
A special apparatus is described for the wet ashing of wine. Pb is determined in the residue colorimetrically by using dithizone. Good results are found for 0.2 ppm Pb in wine of the Vermouth type.

3710 Brustier, V. (Med. Coll., Toulouse, France): (TOXICOLOGIC USE OF ULTRAVIOLET SPECTROGRAPHY.) J. Med. Bordeaux 134:588-91, 1957.
The author's method for urine analysis (1951) was modified for blood analysis. Hilger's spectrographic apparatus was recommended for Pb, Sb, Sn, Bi, Ag, Cd, and Hg detection in biological media. (From Chemical Abstracts 52:15747, 1958)

3711 Fabre, R., Truhaut, R., and Boudène, C. (Lab. Toxicol. Ind. Hyg., Coll. Pharm., Paris, France): Microdosage polarographique du plomb dans le sang et les milieux biologiques. (POLAROGRAPHIC MICRODETERMINATION OF LEAD IN THE BLOOD AND BIOLOGICAL MATERIALS.) Archives des Maladies Professionnelles de Médecine du Travail et de Sécurité Sociale 18, No. 1:5-8, 39-40, 1957.
The method described is based on the following principles: After ashing at slightly <500° in the presence of Mg nitrate, Pb is precipitated with Sr sulfate in alcohol solution at 30°. The precipitate is dissolved after washing, by means of ammonium citrate. The citrated solution, brought to

pH 4.5, is examined for Pb content by polarography in a N atmosphere. The lower limit is 10 μg/100 g blood, collected on heparin in pyrex tube; 5-ml samples are used for analysis. This method is rapid, precise, sensitive and specific. It is suitable for the determination of Pb in blood and urine from the diagnostic point of view.

3712 Fabre, R., Truhaut, R., and Boudène, C. (Coll. Pharmacy, Paris, France): (PRELIMINARY ENRICHMENT IN THE PHYSICAL DETERMINATION OF TOXIC METALS IN BIOLOGIC MEDIA (CADMIUM AND LEAD).) J. méd. Bordeaux et Sud-Ouest 134:764-75, 1957.

Blood or urinary Pb was determined by mineralization with $Mg(NO_3)_2$ at 450-80°, dissolution in HNO_3, and coprecipitation with $Sr(NO_3)_2$ as described by Rosenqvist, but in an alcohol-water medium at pH 1.0. The precipitate was taken up in a pH 9 citrate buffer, acidified to pH 4.5 and polarographed. (33 references; from Chemical Abstracts 52:18899, 1958)

3713 Fazio, C.C.: (POTASSIUM N-BENZOYLAMINOACETATE AS A MICROCHEMICAL REAGENT FOR CATIONS OF LEAD, SILVER, MERCURY (I), AND COPPER (II). Publs. Inst. Invest. Microquím., Univ. Nacl. Litoral (Rosario, Arg.) 21, No. 23:48-54, 1957.

The reagent (100 ml) was made from 8.5 g hippuric acid and 4.5 g $KHCO_3$ in water. A drop of reagent with a drop of $Pb(NO_3)_2$ formed starry clusters of microcrystals in 30-60 sec. The acetate (in the presence of HNO_3) and the chloride reacted similarly. The sensitivity limit is 0.9M Pb, the concentration limit, 5×10^{-5}. (From Chemical Abstracts 53:8917, 1959)

3714 Gage, J.C.: DETERMINATION OF LEAD IN ORGANIC MATERIAL. Analyst 82:453, 1957.

Lead is extracted from a solution of ashed organic material as the diethyldithiocarbamate complex.

3715 Gernet, E.V.: (DETERMINATION OF SMALL AMOUNTS OF TETRAETHYLLEAD AND LEAD IN THE AIR.) Nauch. Raboty Khim. Lab. Gor'kovsk. Nauch.-Issledovatel. Inst. Gigieny Truda i Professional. Boleznei, Sbornik 1957, No. 6:5-16.

The described method involves the determination of TEL and Pb colorimetrically with dithizone dissolved in $CHCl_3$. (17 references; from Chemical Abstracts 54:6391, 1960)

3716 Gertseva, N.S.: (POLAROGRAPHIC DETERMINATION OF BISMUTH, COPPER, AND LEAD SIMULTANEOUSLY.) Trudy Inst. Met., Akad. Nauk SSSR 1957, No. 1:238-40.

It is possible to polarograph Bi, Cu, and Pb simultaneously in a medium of HCl (1:3) and 10% tartaric acid. The potentials of semiwaves are correspondingly equal to -0.12, -0.24, and 0.42 v (bottom Hg). The presence of H_2SO_4 and of excessive HCl does not interfere. Pb can be polarographed with gelatin and without it, taking into consideration that gelatin reduces the diffusional flow of Pb. This method permits determination of any amount of Pb. It is possible to determine Pb at 350 mg/l. (From Referat. Zhur., Met 1957, Abstr. No. 25494; Chemical Abstracts 53:16814, 1959)

3717 Grigorova, L.P. (Sci-Research Inst. Labor Protection, Sverdlovsk, USSR): (DETERMINATION OF LEAD COMPOUNDS IN THE AIR BY AMPEROMETRIC TITRATION.) Gigiena i Sanitariya 22, No. 11:94-5, 1957.

See Abstract No. 3750.

3718 Gryaznova, E.A.: (ADSORPTION METHOD FOR LEAD DETECTION IN CHEMICAL ANALYSIS FOR COURT PROCEDURE.) Uchenye Zapiski, Pyatigorsk. Gosudarst. Farm. Inst. 2:296-9, 1957.

An adsorption method was developed for the detection of mg quantities of Pb in tissues. The method was tested on liver and kidney tissue with an internal standard; 1.875-2.5 mg Pb as Pb acetate was determined. (From Chemical Abstracts 55:16647, 1961)

3719 Jaulmes, P., and Hamelle (Mlle) (Med. Coll., Montpellier, France): Dosage du plomb par la méthode à la dithizone dans le sang, le vin, etc. (DETERMINATION OF LEAD IN BLOOD, WINE, ETC., BY THE DITHIZONE METHOD.) Journal de Médecine de Bordeaux et du Sud-Ouest 134, No. 5:635-41, 1957.

The sample is mineralized in a quartz flask with H_2SO_4-HNO_3, diluted, and neutralized, then the pH is adjusted with HCl to 1.8. An aliquot is added with $HgCl_2$ and precipitated in a centrifuging tube with H_2S. The washed precipitate is taken up in HCl-HNO_3 and transferred in a quartz dish to evaporate $HgCl_2$ at 450°. The residue is taken up in an acetic acid solution of NH_4CN and $(NH_4)_2SO_3$ and the Pb is determined by Fischer's dithizone method. This emergency technique avoids the use of Pb-contaminated reagents.

3720 Johnson, E.I., and Polhill, R.D.A. (Dept. Govt. Chemist, Strand, England): THE USE OF AN ANION-EXCHANGE RESIN IN THE DETERMINATION OF TRACES OF LEAD IN FOOD. Analyst 82:238-41 (Apr.), 1957.

In the method described, microgram amounts of Pb are separated from most other ions by adsorption from N HCl solution on a column of the Cl form of an anion-exchange resin. Pb is recovered by elution with 0.01 N HCl. Comparison of results obtained on several food products by the usual method (described by the authors in 1955) and by the proposed method, gave the following, respectively: 5 g cocoa, 0.84 and 0.82, 0.84 ppm; 5 g syrup, 5.6 and 5.3 ppm; 5 g curry powder, 4.3 and 4.3 ppm.

3721 Kaufmann, H.P., and Bernard, M.: (POLAROGRAPHIC ANALYSIS OF PAINT DRIERS.) Fette, Seifen, Anstrichmittel 59:843-5, 1957.

A detailed discussion of the polarographic analysis of Pb, Fe, Co, and Mn, naphthenates, linoleates, and octoates as used for paint driers is given. Results obtained by this method are compared to those obtained by the usual gravimetric methods. (From Chemical Abstracts 53:19403, 1959)

3722 Khrustaleva, V.A.: (A COLORIMETRIC DETER-

MINATION OF SMALL AMOUNTS OF TETRAETHYL-LEAD IN THE WASHING WATER OF THE HANDS AND WORK CLOTHINGS.) Inform. Byull. Moskov. Nauch.-Issledovatel. Inst. Sanit. i Gigieny 1957, No. 8:11-5.

The method for analyzing the wash water for suspended Pb, Pb dissolved in petroleum, and Pb as TEL is detailed. The $PbSO_4$ of the 3 determinations is dissolved (3% CH_3COONH_4 and tartaric acid) and for colorimetric analysis 1% $K_2Cr_2O_7$ is added. The error of the method is ±4%. (From Chemical Abstracts 54:5328, 1960)

3723 Korenman, I.M., and Russkikh, A.A.: (NEPHELOMETRIC MICRODETERMINATION OF CHLORIDES AND LEAD.) Nauch. Raboty Khim. Lab. Gor'kovsk.-Issledovatel. Inst. Gigieny i Professional. Boleznei 1957, No. 6:17-22.

The method involves a standard series of 0.1-5.0 µg quantities in 5-100 µl of solution with a relative error of 5-6%. For the determination of Pb, the reaction with K chromate in the presence of AcONa in 1% AcOH was used. The method was applicable for the determination of Pb in small volumes of air in the workshops of industrial establishments. (From Referat. Zhur., Met. 1958:Abstract No. 20307; Chemical Abstracts 54:19275, 1960)

3724 Leonov, B.I.: RAPID METHOD FOR THE DETERMINATION OF SMALL QUANTITIES OF LEAD IN URINE.) Trudy Kishinev. Med. Inst. 6: 267-70, 1957.

To 100 ml urine add 30 ml H_2O_2 plus 2-3 ml concentrated HNO_3 or HCl. Boil down to 10-20 ml, evaporate to dryness and incinerate. To the residue add 5-7 ml, and the same volumes of 25% CH_3COOH and 25% CH_3COONH_4. Grind crucible residue and transfer to graduated cylinder. Make up to volume of 10 ml and add 5 drops of concentrated HNO_3 plus 4 ml 2% solution of gelatin or agar in hot CH_3COOH. Add 1 ml of 20% HCHO, mix, add 3 drops 10% Na_2S and compare with standard colorimetrically. Standard: 10 ml mixture of CH_3COOH and CH_3COONH_4 plus 4 ml solution of gelatin or agar and 1 ml of HCHO. The determination takes 3 hr. (From Referat. Zhur. Khim., Biol. Khim. 1958, No. 24290; Chemical Abstracts 53:1449, 1959)

3725 Lur'e, Yu.Yu., and Nikolaeva, Z.V.: (DETERMINATION OF SMALL AMOUNTS OF LEAD.) Zavodskaya Lab. 23:652-5, 1957.

New modifications of the dithizone and chromate methods were developed. In the dithizone method the use of $Cd(CN)_2$ is excluded, Cu is previously extracted and determined with dithizone at pH 2, and Zn is bound with K hexacyanoferrate. In the chromate method the interference of Fe is removed by precipitating Pb as $PbCrO_4$ and concentrating from a large volume of solution by a solution of ZnS. (From Chemical Abstracts 54:8454, 1960)

3726 Mecherly, P.A., Lilly, A., and Whitman, N.E. (Bethlehem Steel Company, Bethlehem, Pa.): LEAD IN AIR AND BIOLOGICAL MATERIAL. Modification of the American Public Health Association's Method. American Industrial Hygiene Association Quarterly 18, No. 2:161-4, 1957.

A speedier and more accurate method for the determination of Pb in air and biological material is described. It was found than an overall saving in time of 25% was effected by this modification. The time required for preparation and ashing remained the same but time was conserved by eliminating the transfer from ashing beaker to separatory funnel and by reading percent transmission directly in the colorimeter rather than estimating the mixed color by visual comparison with a set of standards. Increase in accuracy was confirmed by comparing results from both the visual and colorimetric methods. The comparison between the 2 methods was made using pooled blood samples instead of pooled urine samples and essentially the same result was obtained. The colorimeter proved to be slightly but definitely superior to the visual method of Pb estimation.

3727 Mokranjac, M.S., and Jovanovic, D.A. (Univ. Belgrade, Yugoslavia): (POLAROGRAPHIC ESTIMATION OF TETRAETHYL LEAD IN AIR.) Vojnosan. Pregled 14:109-12, 1957.

Samples of air were drawn at 1 l./min through 10 ml alcohol placed in a midget impinger. After 10 min the solution was transferred to a beaker, 0.5 ml of a 1:3 Br-concentrated HBr solution added, the mixture kept 5 min, evaporated until Br disappeared, 2 ml HNO_3 (d 1.49) added, evaporated to dryness, 1 ml of a solution of 4 g NaOH, 10 g Na citrate, and 10 mg thymol blue in 100 ml water added, an inert gas blown through the solution, and the solution analyzed polarographically from 0.65-0.85 v. (From Chemical Abstracts 52:9496, 1958)

3728 Neumann, F. (Zellstoff-Fabrik Waldhof, Mannheim-Waldhof, Germany): Bestimmung von Bleispuren in organischen Stoffen (visuelles Mischfarbenverfahren mit Dithizone). (DETERMINATION OF TRACES OF LEAD IN ORGANIC SUBSTANCES. VISUAL MIXED-COLOR METHOD WITH DITHIZONE.) Zeitschrift für Analytische Chemie 155:340-9, 1957.

Details of wet and dry ashing procedures, removal of interferences, and the visual determination of Pb by using the mixed-color method with dithizone are reviewed for the determination of ppm of Pb in human and animal foods.

3729 Pilleri, R. (Univ. Turin, Italy): PAPER CHROMATOGRAPHY AND THE SEARCH FOR LEAD IN TOMATO CONSERVE. Rass. chim. per chim e ind. 9, No. 3:14, 1957.

Paper chromatography was used to determine Pb in tomato conserve. Only when the Pb was present in the concentration of at least 0.03% was a clear reaction obtained for the detection of Pb with Na rhodizonate. A distinct pink color appeared even when the Pb was present in the conserve in the proportion of 0.0008%. Fe and Sn did not interfere in the concentration <0.5%. (From Chemical Abstracts 52:4060, 1958)

3730 Schmitz, B. (Andreae-Noris Zahn Akt.-Ges., Frankfurt/Main, Germany): Die komplexometrische Titration des Zinks, Bleis, und Quecksilbers in offiziellen Salben. (COMPLEXOMETRIC TITRATION OF ZINC, LEAD, AND MERCURY IN OFFICIAL OINTMENTS.) Deutsche

Apotheker-Zeitung Vereinigt 97:399-403, 1957.
Previously described EDTA titration methods have been applied successfully to the ointments of D.A.-B.6.

3731 Stanković, M. (Inst. Hyg. P.R. Serbia, Belgrade, Yugoslavia): A POLAROGRAPHIC METHOD FOR THE DETERMINATION OF LEAD IN BLOOD. In XII International Congress of Occupational Health, Helsinki, Finland, 1957, Vol. III, Proceedings, pp. 292-4.
The author analyzed ~1300 blood specimens, 800 urine samples and 350 air samples over a 3-yr period. From this experience he recommends polarographic methods for analyzing large numbers of samples as a routine. The recommended method has the advantage of being very simple and consists essentially of 2 parts: (1) partial wet ashing of the blood samples with concentrated nitric acid, (2) precipitation of Pb from filtered oxidized solutions by Baker's method for urinary Pb determination. In order to test the accuracy of the method 51 specimens in duplicate of blood with a known amount of added Pb were used and blank tests were performed at the same time. Recovery was almost quantitative over the range 20-200 μg Pb/100 ml of blood. After establishing the validity of the method, blood samples of exposed and nonexposed persons were analyzed. Nonexposed persons gave values from 19-36 μg/100 ml with a mean of 26.6 which corresponds well with the generally accepted normal range, while Pb exposed persons showed more or less hazardous concentrations of 65-342 μg/100 ml with a mean of 98. The concentrations were always consistent with known concentrations of Pb in air and urine and with the findings on coproporphyrin.

3732 Stegner, H.E., and Fischer, A. (Med. Akad. Erfurt, Germany): Das Sulfidsilberverfahren zum Topochemischen Schwermetallnachweis. (THE SILVER SULFIDE METHOD FOR THE TOPOCHEMICAL DEMONSTRATION OF HEAVY METALS.) Archiv für Pathologische Anatomie und Physiologie und für Klinische Medizin, Virchows 330:608-18, 1957.
The sulfides of various metals precipitate at different pH levels. Pb can be precipitated in 1N HCl, acetic acid solution, ammoniacal solution, and in NH_3 containing CN^-. A differential precipitation procedure involving fixation of tissue sections with H_2S containing alcohol at different pH levels was used to distinguish Zn^-, Cu^-, and Pb^- salt poisoning in rats.

3733 Tachibana, T., Tamamushi, K., and Tamamushi, R. (Tohoku Univ, Sendai, Japan): STUDIES ON INTERACTION OF GELATIN WITH LEAD IONS. Journal of Biochemistry (Tokyo) 44:33-45, 1957.
Interaction of gelatin with Pb ions has been investigated using a polarographic technique and results have been used to calculate the thermodynamic constants according to the low and high concentrations of Pb ions. The effect of indifferent salts, ionic strength, and temperature has also been investigated.

3734 Vasak, V. (Kozi 4, Prague, Czechoslovakia): ANALYSIS OF INDUSTRIAL ATMOSPHERE. III. DETERMINATION OF LEAD. Pracovni Lekarstvi 9:440-1, 1957.
The Pb compounds are absorbed by suction in paper filters which are then wet-ashed by heating with a mixture of HNO_3, H_2SO_4, and $HClO_4$, the solution evaporated to dryness, the residue treated subsequently with solutions of KCN, NaOH, and gelatin, and Pb determined polarimetrically. (From Chemical Abstracts 52: Abstr. No. 8831, 1958)

3735 Weber, O.A. (Inst. Medical Res., Zagreb, Yugoslavia): NOTE ON POLAROGRAPHIC DETERMINATION OF SMALL AMOUNTS OF LEAD. Croatica Chemica Acta 29:73-7, 1957.
A new supporting electrolyte is described, consisting of 0.5N aqueous succinic acid containing 0.008% of gelatin, which can be used for a Pb concentration of ~1 μg/ml; the half-wave potential vs the saturated calomel electrode is 0.384 ± 0.001 v. For the calibration curve, a series of solutions of Pb in the supporting electrolyte, from 1-10 μg Pb/ml were measured in duplicate after being freed from O by bubbling for 10 min with H purified with alkaline pyrogallol. A plot of mean wave-height (h) in mm, expressed in terms of maximum sensitivity, against concentrations of Pb in μg/ml, gives a straight line, for which a regression equation and standard errors can be calculated in the usual way.

3736 Zielhuis, R.L. (Netherland Inst. Prev. Med., Leyden): METHODS OF COUNTING BASOPHIL PUNCTATED ERYTHROCYTES IN LEAD INTOXICATION. In XII International Congress of Occupational Health, Helsinki, Finland, 1957, Vol. III, Proceedings, pp. 290-2.
The observed number of basophilic stippled erythrocytes (BS) depends on the method of staining and counting. The department of Occupational Medicine of the Netherlands Institute for Preventive Medicine undertook to evaluate different methods.

The results of this investigation are summarized as follows: In light-field examination the counting according to Pappenheim (May Grünwald-Giemsa stain) gives reliable data, if the pH of the buffer solution is ≈7.2 and the concentration of the Giemsa is doubled. The observed number corresponds favorably with that from a methylene blue-borax stain.

It was possible to improve the basophilic aggregation-test (McCord) by differentiating coarse and fine aggregations. The number of the coarse aggregations corresponds favorably with the BS count in Pappenheim-stain. It was also possible to improve the dark-field examination of a methylene blue-Na bicarbonate stain (Lane) by differentiating coarsely and finely stipple erythrocytes (criteria of Bastenier). The observed number of the former corresponds exactly with the BS count according to Pappenheim, or methylene blue borax stain in a tight field. The total of BS in a dark-field corresponds to the total of reticulocytes as counted in vital stain (brilliant-cresyl blue). The examination in a dark-field therefore yields 2 values, ie, the BS and the reticulocytosis, both criteria to evaluate the reaction of the body to Pb absorption. The reliability of a single observation decreases with increasing BS. The reliability of counting in a dark field is greater than that of counting in a light field.

1958

3737 Alberti, G., Bettinali, C., and Salvetti, F.: (BEHAVIOR AND DETERMINATION OF RaB, RaD, AND ThB IN NATURAL WATERS.) In Studi e ricerche della devisione geomineraria, Volume I, Parte II. Rome: Comitato Nazionale per le Ricerche Nucleari, 1958, pp. 699-706.

The conditions under which the natural radioactive isotopes of Pb can be found in natural waters were examined, taking into account the possible behavior of the radiocolloids, and the chemical composition of the water. A simple radiochemical method of measuring ^{210}Pb, ^{212}Pb, and ^{214}Pb is described, by the aid of which it is possible to establish quantitatively the Rn content of natural waters. Using this method it is also possible to determine the Ra and ^{224}Ra that may be present. The conditions are discussed under which it is possible to relate the content of radioactive Pb in the water to that of U and of Th and to the emissive power of the rock from which the water issues. (From Nuclear Science Abstracts 13:Abstr. No. 1256, 1959)

3738 Aleskovskiĭ, V.B., Libina, R.I., and Miller, A.D.,: (MICROQUANTITATIVE DETERMINATION OF LEAD AND COPPER BY PRELIMINARY ENRICHMENT WITH AN ION-EXCHANGE COLUMN.) Trudy Leningrad. Tekhnol. Inst. im. Lensoveta 48:5-11, 1958.

A 20 mm-wide and 50 mm-high column filled with 1 mm diameter cation-exchange resin was used to concentrate Pb and Cu in natural waters flowing through it at a rate of 0.6-1.0 l/hr. The method as described is useful for determining microquantities in natural waters. (From Chemical Abstracts 53:16818, 1959)

3739 Amer, M.N., Ismail, A.M., and El Ghamraway, M.A. (Univ. Cairo, Egypt): ACID-PEROXIDE ASHING AND THE MICRODETERMINATION OF LEAD OR THALLIUM IN FOOD AND BIOLOGICAL MATERIALS. Egyptian Pharmaceutical Bulletin 40, No. 12:57-65, 1958.

The sample is treated with a mixture of 1 part H_2SO_4 and 2 parts HNO_3 heated to solution and then to charring, then treated alternately with 30% H_2O_2 and heating to charring until charring no longer occurs. Pb is determined in the cooled and diluted solution by the dithizone method. The method can be applied to food and biological material such as blood and urine. (From Chemical Abstracts 54:20084, 1960)

3740 American Conference of Governmental Industrial Hygienists, Committee on Recommended Analytical Methods: DETERMINATION OF LEAD IN AIR. A SINGLE EXTRACTION, MIXED COLOR DITHIZONE METHOD. (Approved in 1951) In Manual of Analytical Methods Recommended for Sampling and Analysis of Atmospheric Contaminants. Cincinnati, Ohio, 1958-, LEAD-1-5.

Precautions to be taken in the collection of samples are stated in the introduction, followed by: instructions for collection by electrostatic precipitator or by large impinger; preparation of samples; analysis; standardization of the dithizone solution; calculations; sensitivity (0.001 mg Pb in a 30 ft^3 sample); accuracy; interferences; equipment (photocolorimeter or spectrophotometer); reagents.

3741 Candura, F. (Univ. Pavia, Italy): Dosaggio contemporaneo polarografico del Pb, dello Zn e del Cu, in casi di intossicazione con metalli, prima e dopo trattament con EDTA. (SIMULTANEOUS POLAROGRAPHIC DETERMINATION OF LEAD, ZINC AND COPPER IN CASES OF METAL POISONING, BEFORE AND AFTER TREATMENT WITH ETHYLENEDIAMINETETRAACETIC ACID.) Bollettino della Società Italiani di Biologia Sperimentale 34:1389-90 (Nov.), 1958.

The urine sample is concentrated almost to dryness, treated with HNO_3, evaporated to dryness and ashed. The ash is taken up in HCl. Polarographic determinations were made before and after iv treatment with EDTA.

3742 Chmielowski, J., and Myślak, Z. (Inst. Med. Pracy., Zabrze, Poland): (THERAPEUTIC AND PROPHYLACTIC ACTION OF CALCIUM VERSENATE IN LEAD POISONING. III. THE USE OF ION EXCHANGER IN POLAROGRAPHIC DETERMINATION OF LEAD IN THE URINE OF PATIENTS TREATED WITH VERSENATE.) Med. Pracy 9:279-84, 1958.

Wofatite P ion exchange resin, in 15 cm high packed columns, adsorbed from the urine of versenate-treated patients all contaminants interfering with polarographic determination of Pb; flow rate was <0.3 ml/min. Adsorption of Pb was negligible in the conditions described. The resin may be regenerated by acidification. (From Chemical Abstracts 53:18294, 1959)

3743 Czakow, J., Steciak, T., and Szczerbinska, O. (Polish Acad. Sciences, Inst. Nuclear Res., Warsaw, Poland): Spektrographische Bestimmung von Verunreinigungsspuren in Lösungen auf Metallelektroden in Funken. (SPECTROGRAPHIC DETERMINATION OF TRACE IMPURITIES IN SOLUTION ON METAL ELECTRODES IN A SPARK.) Report No. 31/VII. US Atomic Energy Commission Document No. NP-7085, 1958, 12 pp.

The application of the "copper spark" method to the determination of trace amounts of Al, As, Be, B, Cd, Ca, Ce, Cr, Cu, Fe, La, Pb, Mg, Mn, Ni, P, Si, Ag, Na, Te, and Sn in solutions of isotopes of low radioactivity and containing phosphate, sulfate, and iodide ions is given. The calculated variability coefficient for 15 solutions with a concentration of 1 μg Ni/ml was ±5% for 95% accuracy. A purification method for the auxiliary electrode and the use of the standard paper density scale for quantitative determinations are given. (From Nuclear Science Abstracts 13:Abstr. No. 5288, 1959)

3744 Czarnecka, W., and Sobkowska, A. (Zaklad Anal. Inst. Badan Jadrowych PAN, Warsaw, Poland): POLAROGRAPHIC DETERMINATION OF LEAD IN ASCORBIC ACID SOLUTION. Chem. Anal. 3:501-4, 1958.

Pb can be determined in amounts from 0.001-0.0001 g/l in an ascorbic acid solution. The method was proved by using standard Pb solutions; the error was within ±4%. The sensitivity of the method makes it possible to determine Pb in concentrations of 10^{-6} g/l. The method was used to determine P[illegible] presence of ions of 7 elements and compound[illegible] he determination was not affected by Cd^{++} [illegible]$_3^-$, tartrates, or CrO_4^{--}. (From Chemical Abs[illegible]s 53:8932, 1959)

3745 Dobychin, S.L., and Aleskovskil, V.B.: (CEMENTATION FOR CONCENTRATING AND DETERMINING MICROAMOUNTS OF CERTAIN METALS.) Tr. Leningr. Tekhnol. Inst. Lensoveta, 1958, No. 48.45-8.

The method consists in the prolonged shaking of a large volume (~1 liter) of the test solution (pH 3-3.5) containing 5-100 μg Cu, Pb, Zn, or Cd/l, 8 g Mg SO_4/l, and 8 g NaCl/l, with 0.2 g metallic Mg, separating the Mg, dissolving it in HCl, and determining the metals polarographically in a small volume of solution. This method can be used in determining microamounts of these metals in mineral waters, with not especially pure Mg; in determining lower concentrations, purer Mg is required. (From Ref. Zhur., Khim. 1959, Abstr. No. 45498; Anal. Abstr. 7, Abstr. No. 864; Chemical Abstracts 58:1901, 1963)

3746 Dowling, T., Davis, R.B., Charsha, R.C., and Linch, A.L. (duPont Co.): LEAD-IN-AIR ANALYZER. A SPECIALIZED AIR SAMPLING AND ANALYSIS KIT. American Industrial Hygiene Association Journal 19:330-7 (Aug.), 1958.

A Pb-in-air analyzer is described, which is used as an aid in protecting workers from harm and injury. It may be used to determine whether a tank that has been judged clean is Pb-free or whether an area involving a spill of TEL has been properly decontaminated.

3747 Dymshits, Ya. M., and Pavlyuchenkova, E.G.: (METHOD FOR SPECTROGRAPHIC DETERMINATION OF SMALL CONCENTRATIONS OF LEAD IN BIOLOGICAL MATERIALS.) Trudy Sibir. Fiz.-Tekh. Inst., Tomsk. Univ. im. V.V. Kuibysheva 36:293-6, 1958.

A method was developed for spectrographic determinations of Pb in blood and excreta using a cup-like C electrode. The method can detect concentrations as low as 0.1-0.2 ppm and has an absolute sensitivity of 10^{-7} g Pb. The average error varied from ±12% - ±6% for a concentration range of 1-100 ppm, respectively. (From Chemical Abstracts 54:19810, 1960)

3748 Edge, R.A., and Penny, N. (Govt. Chem. Labr., Capetown, S. Africa): PROPOSED NONASHING TECHNIQUE EMPLOYING ION-EXCHANGE RESINS FOR THE DETERMINATION OF LEAD IN WINE. Journal of the Science of Food and Agriculture 9:401-3, (July), 1958.

The wine, free of solid particles, is passed through a Dowex-50 column, the column is eluted with 4N hydrogen chloride and Pb is determined in the eluate with dithizone. Recovery of added Pb (2 ppm) is 81-101%. Results agree with the iodic-anhydride-nitric acid method, although they are somewhat less consistent. Analysis time is 3 hr. The method is suggested for use in control laboratories to determine whether wine contains <1 ppm Pb.

3749 Elbeih, I.I.M., and Abou-Elnaga, M.A. (Univ. Cairo, Egypt): ESTIMATION OF LEAD AND BISMUTH, IRON AND MANGANESE, AND MAGNESIUM AND BERYLLIUM AFTER PAPER CHROMATOGRAPHIC SEPARATIONS. Chemist Analyst 47, No. 3:59-60, 1958.

After paper chromatographic separation of Pb from Bi, Fe from Mn, and Mg from Be by using phenazone, a collidine-HNO_3 mixture, and a benzoylacetone-butanol mixture as solvents, respectively, and detection of the separated metals by $(NH_4)_2S$, dithiocarbamate, and oxine sprays, respectively, Pb, Bi, Fe, Mn, and Mg are estimated by EDTA titration on excised spots.

3750 Grigorova, L.P. (Sverdlovsk Sci.-Res. Inst. Labor Protection): DETERMINATION OF LEAD IN THE AIR BY AMPEROMETRIC TITRATION. Gigiena i Sanitariya 22, No. 11:94-5, 1958. In Levine, B.S.: U.S.S.R. Literature on Air Pollution and Related Occupational Diseases. Washington, U.S. Department of Commerce, Office of Technical Services, 1960, Vol. 1, pp. 208-10.

Because of the many shortcomings of nephelometric methods for the determination of Pb used in industrial hygiene, the author developed an amperometric titration method for this purpose. The quantitative analysis is based on the amperometric titration of hydrochloric acid solutions of Pb with ammonium molybdate. This method enables the determination of 10 x 10^{-6} mg of Pb in 10 ml. The Hg capillary electrode is used in the analytical procedure, and a calomel-saturated semielement serves as the comparing electrode. Recording of the diffusion current is by means of a reflection mirror galvanometer, with a 0.1N KNO_3 solution as the medium. Since sanitary regulation H 101-54 provides that Pb and its inorganic compounds and Pb sulfide be determined differentially (the MAC's for these are different), this method fulfills this requirement. Soluble and insoluble Pb are determined in one sample, while another sample is used for the determination of total Pb.

3751 Ilutză, G.: METHODS USED IN THE COLLECTION OF AIR SAMPLES FOR DETERMINATION OF LEAD. Igiena (Bucharest) 7:157-69, 1958.

After an examination of methods and devices suggested in the literature, a compressed cotton-wool air filter was developed of 98.5% Pb retention. The filter consists of a glass cylinder 80 mm long and 25 mm diameter, continuing on 1 end with a short tube of 10 mm diameter which fits into a stopper. This is where the air enters. A perforated glass or plastic disc is introduced into the filter, and the filter with a filling of hydrophilic cotton wool or glass wool, is closed with a glass stopper. The advantages of the device are small weight, simple collection, and simple preparation for analysis, done exclusively in the lab. (From Chemical Abstracts 53:623, 1959)

3752 Jeney, E., and Szendrey, S.: Untersuchung der Metallverunreinigung der Luft mit Hilfe der papierchromatographischen Methode. (EXAMINATION OF AIR POLLUTION BY METAL, WITH THE AID OF PAPER CHROMATOGRAPHY.) Z. ges. Hyg. 4, No. 5-6:249-53 1958.

The absolute amount of pollution substances was largest in October, the 2nd half of March and the 2nd half of April. Pb, among other elements, was demonstrable by paper chromatography from the dust of urban air. (From Excerpta Medica, Sect. 17, 5:Abstr. No. 3856, 1959)

3753 Kasparov, A.A.: (A COMPARATIVE STUDY OF SOME METHODS FOR THE DETERMINATION OF LEAD IN URINE.) Zdravookhranenie Tadzhikistana 1958, No. 5:30-2.

A comparative study of the nephelometric bichromate method for the determination of Pb and of the Leontov method was made. Used as subjects were 47 workers of a Pb-Zn mine. The Leontov method gave exaggeratedly higher results insofar as urinary Pb level was concerned. (From Referat. Zhur. Khim., Biol. Khim. 1959, Abstr. No. 13559; Chemical Abstracts 54:3575, 1960)

3754 Korshunov, I.A., Malyugina, N.I., and Vertyulina, L.N.: (POLAROGRAPHIC DETERMINATION OF LEAD AND MERCURY IN SEWAGE.) Trudy Khim. i Khim. Tekhnol. 1:419-22, 1958.

Ions of Pb and Hg undergo reversible reduction at the dropping Hg electrode and give well-defined diffusion currents. The method described gives accurate results when applied to a solution containing not <1 mg Pb/l and not <10 mg Hg/l. (From Chemical Abstracts 54:5993, 1960)

3755 Kulaev, F.N. (State Pedagog, Inst., Gorki, USSR): (PRECIPITATION CHROMATOGRAPHY ON PAPER IN THE ANALYSIS OF INORGANIC CATIONS.) Zhur. Anal. Khim. 13:172-9, 1958.

It was found experimentally that the precipitation zone of a cation on a paper chromatogram attains a stable dimension after 5-6 washings. These dimensions varied for different cations and were direcly related to the solubility products. Other factors studied were the size of the drop, concentration of precipitating solution and the nature of the precipitate formed-crystalline or amorphorus. The effect of external factors such as temperature, extent of physical adsorption, other electrolytes present in solution, interaction of cation and solvent, interaction of precipitates with another, and pH were also studied. The minimum detectable quantity and the limiting dilution were determined and tabulated. (From Chemical Abstracts 52:12664, 1958)

3756 Lipchinski, A., and Krstewa, M. (Chem. Technologisches Inst., Sofia, Bulgaria): Quantitative Bestimmung des Bleis nach dem Verfahren der Oxydations-Innerelektrolyse durch anodische Abscheidung als Blei (IV)-Oxyd. (DETERMINATION OF LEAD BY INTERNAL ELECTROLYSIS WITH ANODIC DEPOSITION OF LEAD DIOXIDE.) Zeitschrift für Analytische Chemie 164:246-50, 1958.

3757 McConnaughey, P.W.: SPOT-TESTING SOLUTIONS, ESPECIALLY FOR DETECTION OF LEAD AND HYDROGEN FLUORIDE. U.S. Patent 2,839,368, June 17, 1958, to Mine Safety Appliances Co.

By depositing on a porous carrier a colorimetric reagent in the form of a suspension in a volatile nonsolvent, the migration of the reagent to the periphery of the wetted area (and enhanced peripheral color intensity) is avoided and a uniform color tests is obtained. Application is described of detection of Pb down to 0.3 μg/cm² of filter paper. (From Chemical Abstracts 53:989, 1959)

3758 Miller, A.D., and Libina, R.I. (Inst. Technol., Leningrad, USSR): (DETERMINATION OF MICROQUANTITIES OF COPPER, LEAD, AND ZINC IN NATURAL WATERS AND SOIL EXTRACTS.) Zhur. Anal. Khim. 13:664-7, 1958.

Two procedures are outlined. In one, Cu, Pb, and Zn are extracted as dithizonates in CCl_4 from a weakly ammoniacal solution in the presence of NH_4 citrate. The 2nd procedure is based on the difference in solubility of Cu, Zn, and Pb diethyldithiocarbaminates in HCl of varying concentrations. Neither of the procedures requires KCN and both are suitable for use in the field. (From Chemical Abstracts 53:6492, 1959)

3759 Mokranjac, M.S., and Jovanovic, D. (Univ. Belgrade, Yugoslavia): Prilog pitanju polarografskog odredivanja olova u mokraci. (POLAROGRAPHIC DETERMINATION OF LEAD IN URINE.) Vojnosanitetski Pregled 15, No. 3:182-5, 1958.

Urine was treated with HNO_3, NaOH, H_2SO_4, and $HClO_2$. The resulting solution was polarographed. The error of the method was ±2.1%.

3760 Nelson, K.W., and Hamm, R.E. (Am. Smelting Ref. Co.; Univ. Utah, Salt Lake City): ANALYTICAL STUDIES ON LEAD IN HUMAN URINE. A.M.A. Archives of Industrial Health 17: 38-44 (Jan.), 1958.

The purpose of the analytical studies was to determine whether Pb in blood and urine is in the form of a chelate. Initial experiments were conducted with columns of cation exchange resin, then for a more rapid evaluation of the Pb-complexing powers of numerous compounds (allantoin, ammonia, aspartic acid, bilirubin, citric acid, creatine, creatinine, cystine, glutamic acid, glycine, hippuric acid, HF, leucine, methionine, oxalic, phosphoric, tartaric acids, tyrosine, urea, uric acid, acetic, acetylsalicylic, aconitic, p-aminobenzoic, ascorbic, carbonic, formic, fumaric, glucuronic, gluconic, glutamic acids) potentiometric titrations of the compound with standard KOH in the absence and in the presence of Pb were carried out. Finally, the strengths of certain Pb complexes were compared and the stability constants of $PbCit^-$ (Kety) at 25 C° and 37 C° were determined by equilibrations against ion-exchange resin.

In discussing the results the authors state that several facts support a conclusion that Pb in urine is bound as a strong neutral or negatively charged chelate or complex. No positive proof, however, is given that such a compound exists, and experiments with a number of possible chelating agents did not indicate that any of their Pb complexes were present in the urine. Citrate is more likely than any of the others, but no conclusive evidence in favor of citrate was obtained.

3761 Nozaki, T., and Ueno, K. (Ehime Univ. Niihama, Japan): (ULTRAVIOLET SPECTROPHOTOMETRIC DETERMINATION OF BARIUM AND LEAD.) Nippon Kagaku Zasshi 79:484-7, 1958.
Pb chromate is dissolved in 4N HCl and the absorption at 267.5 mμ is determined. As little as 3 μg Pb can be determined. (From Chemical Abstracts 53:3995, 1959)

3762 Ol'shanova, K.M., and Koloskova, Z.A.: (USE OF PAPER CHROMATOGRAPHY IN THE QUALITATIVE ANALYSIS OF CATIONS OF THE THIRD AND FOURTH ANALYTICAL GROUPS.) Trudy, Moskov. Tekhnol. Inst. Myasnoĭ i Moloch. Prom. 1958, No. 8:109-13.
Pb, along with 8 other metals, was identified with the aid of suitable developing agents on a 2nd chromatogram, the 1st chromatogram indicating the presence of Fe, Co, Bi, Hg (II), and Cu. An outline of the development and identification of the zones on the chromatograms is given. (From Chemical Abstracts 53:963, 1959)

3763 Roşu, D.: (HEAVY METALS IN FOOD PRODUCTS.) Rev. Ind. Aliment. Produse Animale 1958, No. 3:14-7.
A method for the determination Pb, Sn, and Cu in the food industry is suggested. Pb is determined by bringing the given solution to a pH of 9-11 and adding a solution of diphenylthiocarbazone in $CHCl_3$. A red color is obtained sensitive to 2 μg Pb. (From Chemical Abstracts 53:7447, 1959)

3764 Roushdi, I.M., Abdine, H., and Sadek, W. (Univ. Alexandria, Egypt): (COMPARATIVE STUDY OF LIMIT TESTS FOR IMPURITIES IN SOME PHARMACOPEIAS.) Egypt. Pharm. Bull. 40, No. 12:67-81, 1958.
Specifications for the limits of Cl^-, SO_4^{--}, Fe, Pb, As, and heavy metals and sensitivity of the various tests as set forth in various pharmacopoeias were compared. (From Chemical Abstracts 54:20084, 1960)

3765 Santi, M.L. (S. Martino Hosp., Genoa, Italy): La piombiuria e la piombemia. (URINE AND BLOOD LEAD LEVELS.) Bollettino della Societa Italiana di Biologia Sperimentale 34, No. 11:526-8, 1958.
A modification of a method earlier developed (1956) is described.

3766 Stepanenko, E.M., and Vol'berg, N.S.: (POLAROGRAPHIC DETERMINATION OF SOME SYSTEMS OF METALLIC AEROSOLS HAVING A HYGIENIC SIGNIFICANCE.) Trudy Nauch. Sessii Leningrad. Nauch.-Issledovatel. Inst. Gigieny Truda i Pofzabolevaniĭ Posvyashchen. Itogam Raboty, Leningrad 1956:257-60 (Pub. 1958).
A polarographic method for the determination of Pb in the presence of Cu and Zn in air and for the determination of Pb in the presence of Sn and "colophony" was developed. (From Ref. Zhur., Met. 1959, Abstr. No. 14153; Chemical Abstracts 54:16253, 1960)

3767 Sudilovskaya, E.M.: (PHASE ANALYSIS OF DUST FOR LEAD COMPOUNDS.) Analiz Rud Tsvetnykh Metal. i Produktov ikh Pererabotki, Sbornik Nauch. Trudov 1958, No. 14:129-37.
The Pb in the dust can be present chiefly as PbO and PbS and partly as the sulfate, arsenate, and metallic Pb. The phase analysis is given. (From Chemical Abstracts 53:13873, 1959)

3768 Tanaka, N., and Sakuma, Y. (Tohoku Univ., Sendai, Japan): CONSTANT-CURRENT POTENTIOMETRIC TITRATIONS OF COPPER, LEAD, AND CADMIUM AT A SEMI-CONVECTION MERCURY ELECTRODE. Bunseki Kagaku 7:223-8, 1958.
By using a semi-convection Hg electrode as an indicator electrode, constant-current potentiometric titrations were carried out for Cu(II), Pb(II), and Cd(II) at a low concentration such as 2 X 10^{-5}M. It was found that the titration with the semi-convection electrode was useful in analysis of micromolar solutions, although it was less accurate and less reproducible than that with the dropping electrode. Further, it was confirmed that the titration curves obtained with the semi-convection electrode satisfied the relation previously derived for a constant-current potentiometric titration. (From Chemical Abstracts 54:3070, 1960)

3769 United Kingdom Atomic Energy Authority: THE ABSORPTIOMETRIC DETERMINATION OF LEAD IN URINE. US Atomic Energy Commission Document No. IGO-AM/W-169, 1958, 6 pp.
Organic matter is destroyed and the inorganic residue is dissolved in dilute nitric acid. After adjustment of pH to 2.8, any Bi present is extracted as the dithizonate; the pH is adjusted to 8.0 and Pb is extracted as the dithizonate in chloroform and determined absorptiometrically. (From Nuclear Science Abstracts 12:Abstr. No. 10389, 1958)

3770 Volodjer, K. (Inst. Med. Research, Zagreb, Yugoslavia): (DETERMINATION OF LEAD IN FLOUR AND CORN.) Arhiv. Hig. Rada i Toksikol. 9:89-91, 1958; Chemical Abstracts 53:14365, 1959.

3771 Zaĭtsev, V.A. (Pharm. Inst., Moscow, USSR): (DETERMINATION OF LEAD CATIONS.) Aptechnoe Delo 7, No. 3:21-3, 1958; Chemical Abstracts 53:18748, 1959.

3772 Zhiglinskiĭ, A.B., Zaĭdel, A.N., and Chaĭko, Yu. (Phys. Res. Inst. State Univ., Leningrad, USSR): (SPECTRAL DETERMINATION OF THE ISOTOPIC COMPOSITION OF LEAD. Optika i Spektroskopiya 4:152-5, 1958.
The spectral analysis of Pb isotopes based on hyperfine Pb(I) 4058-A band made use of a hollow

cathode cooled with liquid air requiring no standard. Because of the current density used, the spectrum was practically free of self absorption, and the Doppler width of the lines was small. With the concentration of an isotope >10%, the precision of the method was 2-4% for each isotope. It was unnecessary to apply excessively large corrections. (From Chemical Abstracts 52:9860, 1958)

1959

3773 Brustier, V., and Pitet, G. (Fac. Méd. Pharm., Toulouse, France): (THE ULTRAVIOLET EMISSION SPECTROGRAPH. APPLICATIONS IN PHARMACY, BIOLOGY, AND HYGIENE.) Mises au Point de Chimie Analytique Pure et Appliquée et d'Analyse Bromatologique 7:1-32, 1959; Chemical Abstracts 54:14352, 1960.

see Abstract No. 3820.

3774 Colombo, G.: Apparecchio pratico per la determinazione dell'inquinamento da piombo nell'aria ambiente. (PRACTICAL DEVICE FOR THE DETERMINATION OF LEAD POLLUTION OF THE ATMOSPHERE.) Rassegna di Medicina Industriale 28:533-4 (Nov.-Dec.), 1959.

The apparatus is based on the following principle: A predetermined quantity of air is passed through a sucrose solution, acidified with nitric acid, contained in Meyer absorption tube. The total amount of Pb contained in air, whether in suspension of fine dusts of Pb, PbO, PbO_2 and $PbSO_4$ or fumes, is dissolved in the above solution; Pb is determined colorimetrically, and the color obtained by precipitation of Pb in the form of sulfate is compared with solutions of known content of Pb.

3775 Degtyarenko, A.P., Libina, R.I., and Miller, A.D.: (METHOD OF CONCENTRATING Cu, Zn, Pb, Co, Hg, Ag, V, W, Mo BY PRECIPITATION WITH SULFIDES AND THE DETERMINATION OF THE MICROELEMENTS ADAPTABLE TO THE ANALYSIS OF NATURAL WATERS.) Gidrokhim. Materialy 29:264-72, 1959.

A short method was developed for concentrating some of the microelements in natural waters by precipitation with CdS, Bi_2S_3, and ZnS. The simplicity of the method makes it useful under difficult expeditionary conditions. (From Chemical Abstracts 54:20024, 1960)

3776 Deshmukh, G.S., and Asthana, O.P. (Hindu Univ., Banaras, India): AMPEROMETRIC TITRATION OF LEAD AND COPPER WITH SODIUM SELENITE. Journal of Scientific Research of the Banaras Hindu University 10:41-5, 1959.

Pb, 0.6-2 mg, is determined in 1.0M NH_4 acetate, pH 6.5-6.9, and 0.01% gelatin by using 0.1M Na selenite as the titrant at -0.9 v vs Hg pool. The end point is the minimum current, and corresponds to $PbSeO_3$.

3777 Dixon, B.E., and Metson, P. (Dept. Govt. Chem., Strand, London, England): A FIELD METHOD FOR DETERMINATION OF LEAD FUME. Analyst 84:46-50 (Jan.), 1959.

A field test for determining small amounts of Pb fume in industrial atmospheres is based on the formation of a purple color on test paper impregnated with tetrahydroxy-p-benzoquinone. Results of the field, dithizone and spectrographic methods are compared. The field method is sensitive to about 0.05 mg Pb/m^3. Above 5 times the threshold toxic limit (0.2 mg Pb/m^3), the determination ceases to be precise. Airborne particles of Pb oxide or Pb of the same size range as Pb fume, which have not been formed by condensation, can also be determined by this method. (14 references)

3778 El Raheem, A.A.A., and Amin, A.A.M. (Natl. Res. Center, Cairo, Egypt): OMEGA CHROME BLACK PPV, A NEW METAL INDICATOR. Zeitschrift für Analytische Chemie 163:416-21, 1959.

Omega Chrome Black PPV can be used as the indicator for di-Na(ethylenedinitrilo)tetraacetate titrations of Mg, Zn, Mn^{++}, Ni, Pb, and Cd at pH 10. With Pb and Mn add tartaric and ascorbic acids before the buffer. With Pb some Mn-EDTA complex is required to sharpen the end point.

3779 El Raheem, A.A.A., and Dokhana, M.M. (Min. Public Health Labs., Cairo, Egypt): METOMEGA CHROME CYANINE BLL AS A METAL INDICATOR IN EDTA TITRATIONS. Analytica Chimica Acta 20:133-6, 1959.

The use of Metomega Chrome Cyanine BLL forms a red chelate compound with many metal ions at pH 5.7-7.9. It is especially suitable as an indicator for the titration of Zn, Cd, Mn, and Pb with the Na salt of EDTA. The color changes to blue at the equivalence point. The titration is carried out at pH 6.8.

3780 Eremenko V.Ya.: (THE SPECTROGRAPHIC DETERMINATION OF MICROELEMENTS (Ni, Co, Cu, V, Sn, Mo, Pb, AND Mn) IN NATURAL WATERS.) Gidrokhim. Materialy 29:248-53, 1959; Chemical Abstracts 54:23138, 1960.

3781 Gorsuch, T.T. (Radiochem. Center, Amersham, Bucks, England): RADIOCHEMICAL INVESTIGATIONS ON THE RECOVERY FOR ANALYSIS OF TRACE ELEMENTS IN ORGANIC AND BIOLOGICAL MATERIALS. Report to the Analytical Methods Committee by the Society's First Analytical Chemistry Research Scholar. Analyst 84:135-73 (Mar.), 1959.

The behavior of Pb during the destruction of organic matter was studied and the relative merits of wet and dry oxidations were discussed.

3782 Gnesin, Yu. D.: (USE OF m-SULFANILAMIDOBENZOIC ACID IN INORGANIC ANALYSIS.) Uchenye Zapiski, Pyatigorsk. Farm. Inst. 4:107-16, 1959.

The use of the Na salt of m-sulfanilamidobenzoic acid in the spot test or microcrystalloscopic detection of Pb is described. (From Referat. Zhur., Khim. 1961, Abstr. No. 8D20; Chemical Abstracts 56:6635, 1962)

3783 Haerdi, W., and Monnier, D. (Univ. Geneva, Switzerland): Microdosage de traces de plomb dans le sang, applicable a divers milieux biologiques. (MICROANALYSIS OF

TRACES OF LEAD IN BLOOD, APPLICABLE TO BIOLOGICAL SYSTEMS.) Mitteilungen aus dem Gebiete der Lebensmitteluntersuchung und Hygiene 50:243-57, 1959.

A polarographic method with an accuracy of 1 μg ± 10% is described. The method involves 3 main steps: wet ashing of the blood, extraction of Pb with dithizone and polarography.

3784 Han, K.K. (Central Lab. Regional Hosp. Center, Nancy, France): (DETERMINATION OF LEAD IN BLOOD BY DITHIZONE AFTER REMOVAL OF IRON SALTS BY AMYL ACETATE.) Ann. de Biol. Clin. (Paris) 17:168-72, 1959.

The method involves digestion of whole blood by H_2SO_4-HNO_3 mixture followed by removal of Fe salts by extraction with redistilled amyl acetate. The Pb is extracted from the Fe-free solution with CCl_4 solution of dithizone, and the color of the solution measured. (From Chemical Abstracts 53:22181, 1959)

3785 Herrmann, A.G., and Hoffmann, R.O.: (METHODS FOR THE DETERMINATION OF TRACES OF ELEMENTS IN SALINE DEPOSITS. I. STRONTIUM IN ANHYDRITE. II. LEAD IN ROCK SALT AND SYLVIN.) Monatsber. Deut. Akad. Wiss., Berlin 1, No. 11:690-3, 1959.

Spectrophotometric determination of Pb in dithizone in rock salt and sylvin has been examined for the purpose of using it in routine analyses. The mean relative error is ± 2% for Pb, in the range of 5-500 μg Pb in 50 ml CCl_4. (From Chemical Abstracts 54:19289, 1960)

3786 Karanovich, G.G.: COLORIMETRIC DETERMINATION OF HEAVY METALS WITH THIOACETAMIDE. Trudy Vsesoyuz. Nauch. Issledovatel. Inst. Khim. Reaktivov 1959, No. 23:96-101.

A possibility of colorimetric determination of small quantities of Pb and Cu with thioacetamide instead of H_2S was investigated. Application of the method for determination of Cu and Pb in mono-NH_4citrate, $(NH_4)_2MoO_4$, Ca salts, and alums is also described. (From Chemical Abstracts 54:24115, 1960)

3787 Kargin, Yu.M. (State Univ., Kazan, USSR): (DETERMINATION OF LOW CONCENTRATIONS (OF METALS) BY THE METHOD OF DIFFERENTIAL OSCILLOGRAPHIC POLAROGRAPHY.) Zavodskaya Lab. 25:273-6, 1959.

A differential oscillographic-polarographic method of determination of low concentrations of Cd, Pb, Bi, and Zn in the presence of each other was developed. (From Chemical Abstracts 54:18153, 1960)

3788 Kay, K. (Dept. Natl. Health & Welfare, Ottawa, Canada): AIR POLLUTION. Analytical Chemistry 31, No. 4, Pt. 2:633-45, 1959.

This review covers the 2 yr 1957 and 1958, supplementing previous analytical reviews by the author. In a chapter on chemical analysis of pollutants various methods for the determination of Pb are listed. (468 references)

3789 Klimov, I.T., and Eremenko, V.Ya.: SPECTROGRAPHIC DETERMINATION OF TRACE ELEMENTS IN NATURAL WATERS. I. CONCENTRATING Ni, Co, Ag, Cu, V, Sn, Bi, Fe, Pb, AND Mn BY MEANS OF SODIUM DIETHYLDITHIOCARBAMATE. Gidrokhim. Materialy 29:254-63, 1959: Chemical Abstracts 54:1883e, 1960.

3790 Krylova, M.I.: (DETERMINATION OF LEAD AND COPPER IN FOODS WITHOUT THE USE OF HYDROGEN SULFIDE.) Inform. Byul. Moskov, Nauchn.-Issledovatel. Inst. Sanit. i Gigieny 1958, No. 23:30-4 (Pub. 1959): Chemical Abstracts 57:3831, 1962.

3791 Landry, A.S.: CALCIUM CHLORIDE AS A SUPPORTING ELECTROLYTE IN THE POLAROGRAPHIC DETERMINATION OF TOXIC CONSTITUENTS IN AN ATMOSPHERIC SAMPLE. I. LEAD AND CADMIUM. Advan. Polarog. Proc. Intern. Congr., 2nd. Cambridge. Eng. 2:591-605, 1959.

The study of 2.7M $CaCl_2$ at a pH of 6 as a supporting electrolyte has led to a sensitive method for determining Pb in atmospheric samples. (From Chemical Abstracts 57:10148, 1962)

3792 Lektorskaya, N.A., and Kovalenko, P.N. (State Univ., Rostov-on-Don, USSR): (POLAROGRAPHIC DETERMINATION OF BISMUTH AND ANTIMONY, LEAD, AND TIN, IN THE PRESENCE OF ONE ANOTHER.) Nauch. Doklady Vysshei Shkoly, Khim., i Khim. Tekhnol. 1959, No. 1:102-4.

In the simultaneous presence of Sn and Sb the height of the Sn wave is the constant sum of the heights of both waves, Pb and Sn; the growth of the height of the wave of Pb on adding Sn to the solution is directly proportional to the concentration of the latter. The method for determination of Sn and Pb is given. (From Chemical Abstracts 53:13876, 1959)

3793 Loginova, L.G. (All-Union Inst. Hydrogeol. Eng. Geol., Moscow, USSR): SPECTROSCOPIC-ANALYTICAL DETERMINATION OF TIN, ZINC, CADMIUM, ANTIMONY, LEAD, AND ARSENIC IN NATURAL WATER. Zhur. Anal. Khim. 14:217-21, 1959.

By the method described, a Pb content of 4 x 10^{-}[illegible] to 1 x 10^{-}[illegible] % in natural water was found, the average relative error being ±12%. (From Chemical Abstracts 53:16422, 1959)

3794 Miller, A.D., and Libina, R.I.: (CONCENTRATING AND DETERMINING TRACES OF ELEMENTS IN NATURAL AND INDUSTRIAL WATERS BY PRECIPITATION WITH CALCIUM CARBONATE.) Zhur. Priklad. Khim. 32:2624-31, 1959.

Traces of elements in H_2O were coprecipitated with $CaCO_3$. Traces of Pb among others were determined. Methods of analysis are given. A new method for the determination of Zn, Pb, and Cu in the same sample in the presence of large amounts of Fe is described. (From Chemical Abstracts 54:7938, 1960)

3795 Nemirovskaya, A.F., and Petrashen, V.I.: (ORGANIC REAGENTS IN THE ANALYTICAL CHEMISTRY OF LEAD.) Trudy Novocherkassk. Politekh. Inst. im. S. Ordzhonikidze 97:193-203, 1959.

A review with 31 references. (From Chemical Abstracts 55:8155, 1961)

3796 North, A.A., and Wells, R.A. (Chem. Res. Lab., Teddington, England): CHEMICAL METHODS OF TRACE ANALYSIS. ANALYTICAL METHODS FOR GEOCHEMICAL PROSPECTING. Congr. Geol. Intern., 20th Session, Mexico City, Symposium on Geochem. Exploration, 1956:347-474, 1959.

The following papers deal with the analysis of Pb: Accuracy and Precision of Field Methods of Trace Analysis used in Geochemical Exploration by U.S. Geological Survey; Field Performance of Some Analytical Methods Used in Geochemical Prospecting; Semiquantitative Determination by Confined Spot of Traces of As, Ni, Cu, Pb, Zn, and Au, in Soils; Field Method for Semiquantitative Determination by Paper Chromatography of Copper, Lead, and Zinc in Soils; Equipment and Field Method for the Semiquantitative Determination of Zinc and Lead by Dithizone. (From Chemical Abstracts 56:6639, 1962)

3797 Pollard, F.H., Hanson, P., and Geary, W.J. (Univ. Bristol, England): 4-(2-PYRIDYLAZO)-RESORCINOL AS A POSSIBLE ANALYTICAL REAGENT FOR THE COLORIMETRIC ESTIMATION OF COBALT, LEAD, AND URANIUM. Analytica Chimica Acta 20:26-31, 1959.

4-(2-Pyridylazo) resorcinol is synthesized and used as a colorimetric reagent for Co, Pb, and U. It is claimed to be the first water soluble reagent for Pb. Readings are taken for Pb at 520 mμ. Beer's law is followed for Pb 0-5 μg/ml.

3798 Quino, E.A. (Esso Standard Oil Co., New York, N.Y.): FIELD METHOD FOR THE DETERMINATION OF INORGANIC LEAD FUMES IN AIR. American Industrial Hygiene Association Journal 20:134-7 (Apr.), 1959.

The field method described should be especially useful to the industrial hygienist for environmental surveys away from laboratory facilities. The procedure which is based on a color reaction gives accurate results. The stains obtained on the filter paper have remained stable thus far for a period of 7 mo.

3799 Society for Analytical Chemistry, Analytical Methods Committee: THE DETERMINATION OF LEAD. REPORT PREPARED BY THE METALLIC IMPURITIES IN ORGANIC MATTER SUB-COMMITTEE. Analyst 84:127-34 (Mar.), 1959.

A modified method for the determination of Pb, based on the method developed by the Lead Panel in 1954, is reported. When considerable Bi interference is indicated, a special procedure must be used.

3800 Sogolovskaya, A.G., and Nemirovskaya, A.F.: (QUINALIZARIN AS AN ANALYTICAL REAGENT.) Nauch. Raboty Stud. Khim.-Tekhnol. Fak., Novocherkasskiĭ, Politekh. Inst. im. S. Ordzhonikidze 1959, No. 7:9-16.

Quinalizarin can be used in the determination of Pb at pH 6.2-6.35 and pH 8.2-8.8. (From Chemical Abstracts 55:12142, 1961)

3801 Tarasenko, M.I.: (THE USE OF SECTIONAL CENTRIFUGE TEST TUBE FOR RAPID GRAVIMETRIC DETERMINATIONS OF LEAD.) Sbornik Nauch. Rabot, Moskov. Farm. Inst. 2:107-11, 1958 (Pub. 1959).

The title method is described. (From Referat. Zhur., Met. 1960, Abstr. No. 11716; Chemical Abstracts 55:12141, 1961)

3802 Tarasenko, M.I.: (RAPID DETERMINATION OF SMALL AMOUNTS OF LEAD BY CENTRIFUGATION.) Sbornik Nauch. Rabot. Moskov. Farm. Inst., 2:112-24, 1958 (Pub. 1959).

The method is based on the precipitation of Pb^{++} as $PbSO_4$ in a centrifuge tube with a cap jointed to its lower end by a ground glass joint, in which the precipitate is dried and weighed. The determination takes 30-40 min; the relative error varies from ±0.17% to ±0.36%. (From Referat. Zhur., Khim. 1960, Abstr. No. 34,505; Chemical Abstracts 55:236, 1961)

3803 Tarasenko, M.I., Bulenkov, T.I., and Mirolyubova, S.P. (Pharm. Inst., Moscow, USSR): (RAPID AND SIMPLE METHOD FOR DETERMINATION OF LEAD ACETATE AND OF LEAD IN BASIC LEAD ACETATE (PHARMACOPOEIA PREPARATIONS) AS THE POTASSIUM-LEAD DOUBLE SALT.) Sbornik Nauch. Rabot Moskov. Farm. Inst. 2:133-9, 1958 (Pub. 1959).

A gravimetric method based on the precipitation of Pb as $K_2SO_4 \cdot PbSO_4$ was worked out to replace the iodometric determination of the Soviet Pharmacopeia VIII. The method requires <1/2 the time of the iodometric method. (From Chemical Abstracts 56:6094, 1962)

3804 Tripathi, D.N., and Tewari, S.N.: (DETERMINATION, IN FORENSIC TOXICOLOGY, OF METALLIC POISONS BY PAPER CHROMATOGRAPHY.) J. Prakt. Chem. 9:1-2, 1959; Chemical Abstracts 53:20231, 1959.

3805 Truhaut, R., and Boudène, C.: Microdosage du plomb dans le sang et dans l'urine par titrimétrie à la dithizone. (MICRODETERMINATION OF LEAD IN THE BLOOD AND IN THE URINE BY TITRATION WITH DITHIZONE.) Annales de Biologie Clinique (Paris) 17:153-67 (Mar.-Apr.), 1959.

The digestion liquid used is Pb-free HNO_3 which has been in contact with SO_2 for 3 hr. The micro-Kjeldahl-type digestion is terminated when the liquid is colorless. The Bi present in the sample is eliminated since it interferes with the Pb determination. The amount of Pb present is determined by titration with dithizone. This method can be satisfactorily used for 2 ml of blood and 5 ml of urine. The method is specific for Pb and has a precision >5%.

3806 Tsviling, A.Ya., and Tertilova, A.G.: (DETERMINATION OF LEAD IN CANNED FOODS BY CHROMATOGRAPHIC SEMIMICRO ANALYSIS.) Trudy Odessk, Tekhnol. Inst. Pishchevoĭ i Kholodil. Prom 9, No. 2:149-53, 1959.

The title method using canned tomato puree is described. 1 μg of Pb can be detected in the sample. (From Chemical Abstracts 54:25348, 1960)

3807 Tufts, B.J. (Univ. Chicago, Ill.): DETERMINATION OF PARTICULATE LEAD CONTENT IN AIR. RESULTS OF TEST IN CITY TRAFFIC. Analyti-

cal Chemistry 31:238-41 (Feb.), 1959.
Pb particles in air can be identified by a micro spot test on membrane filters through use of an alcoholic solution of tetrahydroxyquinone, which forms a red precipitate with Pb. The method, used in a study of automobile exhaust fumes, shows application possibilities in industrial hygiene problems involving Pb and Pb products.

3808 Union of Soviet Socialist Republics: QUANTITATIVE DETERMINATION OF LEAD AND ITS COMPOUNDS IN THE AIR. Approved by USSR Chief State Sanitary Inspector, V.M. Zhdanov, September 30, 1959, No. 122-1/326. In Levine, B.S.: U.S.S.R. Literature on Air Pollution and Related Occupational Diseases. Washington, U.S. Department of Commerce, Office of Technical Services, 1963, Vol. 8, pp. 34-8.
The method, applicable to the determination of Pb and its compounds in workroom air is based on the fact that degree of turbidity formed by the interaction between Pb ions and K chromate increases with the increase of Pb ion concentration; comparison is made with the aid of a standard scale. Sensitivity is 1 µg of Pb in analyzed solution volume. The method is not specific in the presence of Ba salts. The limit of allowable concentration of Pb and its compounds was set at 0.01 mg/m^3 by regulation No. 279-59, issued Jan. 10, 1959.

3809 Union of Soviet Socialist Republics: QUANTITATIVE DETERMINATION OF TETRAETHYL LEAD IN GASOLINE OF DIFFERENT TRADE MARKS AND IN KEROSENE. Approved by USSR Chief State Sanitary Inspector, V.M. Zhdanov, September 30, 1959, No. 122-1/330. In Levine, B.S.: U.S.S.R. Literature on Air Pollution and Related Occupational Diseases. Washington, U.S. Department of Commerce, Office of Technical Services, 1963, Vol. 8, pp. 64-6.
The method is applicable to the determination of small quantities of TEL in gasoline used as solvents and as automobile fuel, and in kerosene. TEL is decomposed by I and the Pb ion determined as Pb chromate. Sensitivity of the method is 1.56 µg TEL/analyzed volume of the solution.

3810 Van der Westhuyzen, J.P. (Chem. Serv., Capetown, S. Africa): AN IMPROVED ASHING TECHNIQUE FOR THE DETERMINATION OF LEAD IN WINES AND SPIRITS. South African Journal of Agricultural Science 2:183-6, 1959.
The dry-ash technique compared with that of wet oxidation for determination of Pb in wines and spirits gave more reproducible results and higher Pb recovery, greatly reduced time of preparation and introduced no interfering elements. Time required, 2-3 hr.

1960

3811 Babin, M.E., ed.: (TECHNICAL SPECIFICATIONS FOR METHODS OF DETERMINING TOXIC SUBSTANCES IN THE AIR.) Tekhnicheskie Usloviya na Metody Opredeleniya Vrednykh Veshchestv v Vozdukhe Vol. 1, 1960, 91 pp.
The collection of the methods approved by the USSR government includes sections of the determination of Pb in air and TEL in gasoline and kerosene. (From APCA Abstracts 6: Abstr. No. 3561, 1961)

3812 Baer, W.K., and Hodge, E.S. (Mellon Inst., Pittsburgh, Pa.): SPECTROCHEMICAL ANALYSIS OF SOLUTIONS. A COMPARISON OF FIVE TECHNIQUES. Applied Spectroscopy 14:141-6, 1960.
The solutions contained Pb and other cations and the methods used were rotating platform, flat top, rotating disk, porous cup, and plastic cup. The excitation conditions were high voltage, NSL Sparklike, and NSL Arclike. General conditions for best sensitivity and reproducibility are stated.

3813 Ball, E.E. (Mine Safety Appliance Co., Pittsburgh, Pa.): PHYSICAL AND CHEMICAL TECHNIQUES USED TO SELECTIVELY SENSITIZE A PARTS PER BILLION ANALYZER. Instrument Society of America, Proceedings of the Instrumentation and Methods of Analysis Symposium 6, 5-1-5-5, 1960.
An instrument, the Billion-Aire, has been developed for continuously detecting and recording concentrations of certain gases, among them TEL, in the ppb range. The Billion-Aire which is described and diagrammed in detail, operates on gaseous conduction phenomena as affected by aerosols or subvisible smokes. To be detected by the instrument in the 0-100-ppb range, TEL is pyrolyzed for breakdown at exit gas temperature of 400°C. Higher sensitivity may be achieved by using ultraviolet radiation for breakdown; with this arrangement, full-scale sensitivity is possible for 8 µg/TEL/ft^3, ie, roughly in the 0-20-ppb range.

3814 Ball, K.E., Brozart, C.J., and Saltzman, R.: DETECTION OF TRACE AMOUNTS OF NICKEL CARBONYL AND TETRAETHYL-LEAD IN AIR. Paper presented at Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Feb. 29-Mar. 4, 1960.
The MSA Billion-Aire is capable of detecting various toxic gases in the ppb range. An ionization chamber is used as the detector and the mechanism of detection is the decrease in ion current as a finely divided particulate passes through the chamber. The particulate is formed by chemical reaction or pyrolysis of the gas to be detected. Two typical applications are the detection of Ni carbonyl and TEL in the range of 0-50 ppb. Both are converted by pyrolysis to the elemental metal and/or oxides. Experimental work on TEL with an ultraviolet converter has indicated that even higher sensitivities may be realized. (From authors' abstract, Pittsburgh Conference p. 36: Abstr. No. 16)

3815 Barbieri, R., Belluco, U., and Tagliavini, G. (Inst. Nuclear Chem., Padua, Italy): (QUANTITATIVE ANALYSIS OF MIXTURES OF ORGANO-LEAD COMPOUNDS.) Ricerca Sci. 30: 1671-4, 1960.
Compounds of the type R_4Pb, R_3PbCl, and R_2PbCl_2 (R = Me,Et, or Ph) are separated by paper chromatography. The method is accurate within 2%. (From Chemical Abstracts 55:14175, 1961).

3816 Barbieri, R., Tagliavini, G., and Belluco, U. (Inst. Nuclear Chem., Padua, Italy): (ANALYSIS OF ORGANO-METALLIC COMPOUNDS.) Ricerca Sci. 30:[illegible], 1960.
Mixtures of R_3PbCl and R_2PbCl_2 can be analyzed spectrophotometrically as the dithizones in $CHCl_3$. The method yields results with a maximum error of [illegible] for concentration [illegible] μg Pb. (From Chemical Abstracts 55:14159, 1961)

3817 Kaszas, J. (Eötvös Loránd Tech. Coll., Budapest, Hungary): Igen kis mennyiségű ólom egyszerű és gyors meghatározása ditizonos módszer segítségével. (A SIMPLE AND RAPID DETERMINATION OF VERY SMALL QUANTITIES OF LEAD BY MEANS OF THE DITHIZONE METHOD.) Acta Pharmaceutica Hungarica 30:250-5, 1960.
The dithizone method for determining Zn was used for determining Pb. The advantage of the method was that interfering (CCl_4-solution) organic compounds could be mineralized before measuring because the determination was not disturbed by ions forming complexes or precipitates.

3818 Belluco, U., Tagliavini, G., and Barbieri, R. (Univ. Padua, Italy): Contributo all'analisi di composti metallorganici del piombo. (A CONTRIBUTION TO THE ANALYSIS OF METALLORGANIC LEAD COMPOUNDS.) Ricerca Scientifica 30:1675-9 (Nov.), 1960.
The authors describe the argentometric and iodometric methods for the determination of hexaethyldiplumbane. A procedure is presented for the determination of hexaethyldiplumbane and TEL which are simultaneously present as a dispersed phase in an aqueous solution of triethyllead chloride. (From authors' summary; 30 references)

3819 Borisova, E.N. (Med. Inst., Kazan, USSR): (HISTOCHEMICAL REACTION FOR LEAD IN FOODS USING DITHIZONE.) Voprosy Pitaniya 19: 83-6 (July-Aug.), 1960.
A method for qualitative detection of Pb in food was described. (From Chemical Abstracts 56:14673, 1962)

3820 Brustier, V., and Pitet, G. (Fac. Med. Pharm., Toulouse, France): Le dosage de la plombémie par spectrographie d'émission dans l'ultraviolet. (DETERMINATION OF LEAD IN THE BLOOD BY EMISSION SPECTROGRAPHY OF ULTRAVIOLET RANGE.) Revue Française d'Etudes Cliniques et Biologiques 5:946-7 (Nov.), 1960.
The estimation of Pb in blood, using the Bouty michrophotometer or the Vassy microdensitometer is described. Sn was used as the internal standard because its volatility is similar to that of Pb and its line 2840, is close to that of the Pb, 2833. The method was applied to the analysis of blood Pb.

3821 Bryant, J.I., and Kemp, M.D. (U.S. Army Engineer Research and Development Lab., Fort Belvoir, Va.): SIMULTANEOUS POLAROGRAPHIC DETERMINATION OF LEAD AND AZIDES IN AQUEOUS MEDIA. Analytical Chemistry 32:758-60 (June), 1960.
A polarographic method has been developed for the simultaneous determination of Pb and azide ions of Pb azide in aqueous solutions. Its sensitivity allows safe low concentrations of Pb and azide ions to be effectively determined in a fraction of the time required by classical analytical methods. The polarographic method was standardized by gravimetric determinations. (From authors' summary)

3822 Bühler, W. (CIBA Ltd., Basel, Switzerland): Die Anwendung der Polarographie in der industriellen Praxis. (USE OF POLAROGRAPHY IN THE INDUSTRIAL LABORATORY.) Zeitschrift für Analytische Chemie 173:17-21, 1960.
A method for the determination of Pb in food dyes is described.

3823 Bulgakova, A.M., and Volkova, Z.M. (All-Union Inst. Chem. Reagents, Kharkov, USSR): EXTRACTION AND PHOTOMETRIC DETERMINATION OF TRACES OF LEAD IN HIGH-PURITY REAGENTS. Zhur. Anal. Khim. 15:591-4, 1960
This method is particularly adapted for determination of traces of Pb in Tl compounds. (From Chemical Abstracts 55:15221, 1961)

3824 Chen, W.H., and Ju, J.L. (Szechuan Med. Coll., China): (RAPID DECOMPOSITION OF URINE IN LEAD DETERMINATION.) Yao Hsueh T'ung Pao 1960, No. 4:179-80, 1960.
Evaporate 20 ml urine to dryness, cool, add 2 ml of acid mixture. Heat gently until white fumes form; then increase heat until the solution becomes clear. Cool and dissolve in 3-5 ml 3% HNO_3. Extract Pb with dithizone and determine photometrically. (From Chemical Abstracts 56:6295, 1962)

3825 Chen, Y. (Natl. Taiwan Univ., China): DETERMINATION OF MICRO AMOUNTS OF LEAD BY THE "ISOTOPE DILUTION METHOD OF ANALYSIS" WITH ThB(Pb^{212}) AS A TRACER. J. Chinese Chem. Soc. (Taiwan) 6:118-26 (Mar. 15), 1960.
The determination of micro amounts of Pb in aqueous solutions was described. ^{212}Pb was obtained from Th nitrate by extraction with dithizone. A solution of dithizone in chloroform was saturated with Pb containing ^{212}Pb and equilibrium was established with an aqueous layer containing various amounts of Pb. A formula was presented for simply measuring the amount of Pb in the aqueous solution. (From Nuclear Science Abstracts 18:Abstr. No. 41334, 1965)

3826 Costa, A.C.S.: (QUALITATIVE TEST FOR LEAD WITH CHLORANILIC ACID.) Ciencia e Cult. (São Paulo) 12:27, 1960.
Pb gives a chestnut-brown precipitate slowly in dilute solution, sensitive to 5 μg Pb at a dilution of 1:10,000 when treated with a drop of 10% $HClO_4$ and a drop of 0.1% aqueous chloranilic acid. (From Chemical Abstracts 56:2874, 1962)

3827 Dixon, B.E., and Metson, P. (Lab. Government Chemist, London, England): A FIELD METHOD FOR DETERMINING TOTAL AIR-BORNE LEAD. Analyst 85:122-6 (Feb.), 1960.
A field test is described for determining small amounts of total air-borne Pb in industrial atmospheres; it can be carried out on the sample used

for determining Pb fume by Dixon and Metson's staining method.

3828 Dożańska, W., and Czarnodolowa, H.: (INVESTIGATIONS INTO THE DETERMINATION OF LEAD IN INDUSTRIAL WASTES AND WASTE WATERS.) Roczn. Zakl. Hig. Warsz., 11:127-42, 1960.
A comparative study was made of various methods for the determination of Pb. For quantities up to 0.02 mg Pb in a sample, the modified dithizone colorimetric method is recommended. Methods for mineralization and the efficiency of different reducing agents are described. After examination of different volumetric and gravimetric methods for determination of larger quantities, the sulfate method is recommended. (From Water Pollution Abstracts 35, Abstr. No. 1121, 1962)

3829 Duliński, W., and Kohsling, Z. (Acad. Gorniczo-Hutnicza, Kraków, Poland): (TETRAETHYLLEAD IN AIR.) Gas, Woda i Tech. Sanit. 34:258-9, 1960.
A nephelometric method for the determination of TEL is described. (From Chemical Abstracts 55: 6742, 1961)

3830 El Raheem, A.A.A., Amin, A.A.M., and Osman, F.A. (Natl. Research Centre, Cairo, Egypt): OMEGA CHROME BLACK BLUE G AS A COLORIMETRIC REAGENT FOR THE MICRODETERMINATION OF VARIOUS CATIONS. Z. Anal. Chem. 171:420-31, 1960
Omega chrome black blue G can be used to determine Pb, among 4 other elements, in buffered pH 10 solution by measuring the decrease in absorption at 625 mμ. (From Chemical Abstracts 54:8447, 1960)

3831 Eulitz, G. (Univ. Heidelberg, Germany): (SEPARATION OF Pb, Ca, Sr, Ba, AND Ra WITH CATION EXCHANGERS.) Nukleonik 2:85-7, 1960.
Pb, Ca, Sr, Ba, and Ra are separated quantitatively in a single process with cation exchangers by using gradient elution. After separation, the concentrations of ^{90}Sr, ^{89}Sr, ^{140}Ba, and ^{210}Pb, chiefly in precipitates and in the air, are measured. (From Chemical Abstracts 54:18179, 1960)

3832 Gil'manshin, G.G.: (POLAROGRAPHIC DETERMINATION OF SMALL AMOUNTS OF BISMUTH AND LEAD.) Materialy 1-oi (Pervoi) Konf. Molodykh Nauchn. Rabotn. Kazani 1959, Sekts. Khim., Kazan 141-5 (Pub. 1960).
A polarographic method for determining Bi and Pb (10^{-6}-10^{-7} g-ions/l) in $Cd(NO_3)_2$ and $K_2Cr_2O_7$ was developed. (From Chemical Abstracts 58:3876, 1963)

3833 Gorsuch, T.T. (Radio Chem. Center, Amersham, Bucks, England): THE SEPARATION OF LEAD-212 FROM THORIUM. Analyst 85:225-6 (March), 1960.
A method for the separation of ^{212}Pb from natural thorium in equilibrium with its decay products is described.

3834 Gulina, O.M.: (COLORIMETRIC DETERMINATION OF LEAD IN THE URINE.) Gigiena Truda i Professional. Zabolevaniya 4, No. 11:58-60, 1960.
Pb (organic and inorganic) was determined by colorimetric methods with dithizone in 50 ml urine, with an accuracy of 0.01 μg Pb. Error of the determination was 4.5%. (From Chemical Abstracts 55:21216, 1961)

3835 Keenan, R.G. (Public Health Serv., Cincinnati, O.): NEW ANALYTICAL TECHNIQUES FOR INDUSTRIAL HYGIENE. A.M.A. Archives of Industrial Health 21:261-7 (March), 1960.
The use of an anionic exchange resin to remove completely the Pb present in solutions of normal blood ash and in chemical reagents used in the preparation of spectrographic standards is described. By means of emission spectroscopy, using a spectroscopic buffer consisting of a mixture of LiCl and graphite, sensitivities of 0.005 μg Pb in the electrode charge were obtained routinely. (17 references)

3836 Khokhlova, O.I. (Pharm. Inst., Moscow, USSR): (CONTRIBUTION TO THE METHODS OF DETERMINING Pb^{++}, Cu^{++}, AND Fe^{+++} IMPURITIES IN PHARMACEUTICAL PREPARATIONS.) Aptechnoe Delo 9, No. 1:28-34, 1960.
A method for separating Pb is described. The lowest detectable concentration was Pb^{++} 1 μg/l. (From Chemical Abstracts 54:14575, 1960)

3837 Kleinkopf, M.D.,: SPECTROGRAPHIC DETERMINATION OF TRACE ELEMENTS IN LAKE WATERS OF NORTHERN MAINE. Bulletin of the Geological Society of America 71:1231-42, 1960.
The metal content is expressed as the weight per cent of the recovered residue rather than as the absolute metal content per volume; this largely eliminates the effects of changes in rates of erosion and amounts of rainfall and runoff. A study of 3 lakes showed that variations are not great laterally or with depth for any one element, and it is suggested that a single sample could be representative of the lake as a whole.

3838 Kühnen, G. (Dust Res. Inst., Bonn, Germany): Bestimmung von Blei in Luft. (DETERMINATION OF LEAD IN AIR.) Staub 20:77-81 (March), 1960.
A new filter measuring instrument is described, as well as a technique based on color development with dithizone by which 10-120 μg Pb can be determined within an average deviation of 1%. Quantities as low as 1 μg can be determined with reduced accuracy.

3839 Loveridge, B.A., Milner, G.W.C., Barnett, G.A., Thomas, A.M., and Henry, W.M.: DETERMINATION OF Cu, Cr, Pb, AND Mn IN SEA WATER. At. Energy Research Estab. (Gt. Brit.) R-3323, 1960, 36 pp.
Spectrophotometric procedures are given for determination of natural concentration of these elements. Average values for soluble Pb range from 0.6-1.5 μg/l. In sea water these elements were found associated with suspended solids, which were removed by filters that retained particles 1 μ in diameter or larger. (29 references; from Chemical Abstracts 54:24118, 1960)

3840 Machata, G., and Neuninger, H. (Univ. Vienna, Austria): Zur Methodik der Bleibestimmung im Harn. (METHODS OF LEAD DETERMINATION IN URINE.) Wiener Medizinische Wochenschrift 110:39-41 (Jan. 16), 1960.

The results, obtained by the total Pb method and the method of Taeger, in the routine analysis of urine from Pb exposed workers were critically examined. The differences in the Pb values established are presented in a table. For a quantitative determination of Pb excreted by the organism only the determination of the total Pb should be used. This is the only reliable method especially in view of the application of chelates in the treatment of heavy metal poisoning since the precipitation method will only partially detect the complexed Pb. A simple method for the evaluation of total Pb by means of the dithizone method is presented. Values from 100-150 μg total Pb/l is accepted as the limit value, in contrast to 40 μg found by Taeger. Any excess indicates increased Pb absorption. (From authors' summary)

3841 Mehta, I.C.R., Mankad, N.V., and Devani, M.B.: (L.M. Coll. Pharm. Ahmedabad, India) DETERMINATION OF LEAD IN PHARMACEUTICALS. Indian Journal of Pharmacy 22:37-9, 1960.

The results obtained by pharmacopoeial methods are lower than those obtained by the gravimetric SO_4 method. A comparative study of these methods with the complexon and salicylaldoxime methods is reported by using PbO, Pb acetate, and strong solutions of Pb subacetate.

3842 Munro, R.E.C., and Wise, W.S. (Imp. Coll. Trop. Agr., Trinidad): THE DETERMINATION OF TOTAL LEAD IN BASIC LEAD REAGENT. Pro. Brit. West Indies Sugar Technologists 1960:224.

Total Pb in basic Pb reagent used for polarizing sugar products is determined. The method gives results slightly lower than those of the gravimetric or iodometric methods. (From Chemical Abstracts 59:11745, 1963)

3843 Odescalchi, C.P., and Stranec, G.: Dosaggio colorimetrico e polarografico del piombo atmosferico raccolto su filtro cellulosico. (COLORIMETRIC AND POLAROGRAPHIC DETERMINATION OF ATMOSPHERIC LEAD COLLECTED ON CELLULOID FILTERS.) Rassegna di Medicina Industriale 29:356-61 (Sept.-Oct.), 1960.

The authors verify the efficiency of a simple quantitative measure system of Pb in air, collected on celluloid filters, comparing it with conventional chemical methods and with polarographic analysis, the methodology of which is shown here.

3844 Petrova, G.S.: (A NEW REAGENT, SULFARSACEN (PLUMBON).) Zavodskaya Laboratoriya 26, No. 9:1162-3, 1960.

The use of sulfarsacen for the colorimetric determination of small amounts of Pb and as an indicator in the complexometric determination of Pb, Zn and Cd is described. Sulfarsacen is a red-brown powder which is soluble in water and aqueous alkali, sparingly soluble in organic solvents and decomposed by solutions of inorganic acids. Its advantages over dithizone are its solubility in water, its simple use and the fact that it does not require K cyanide to mask interferences. (From Chemisches Zentralblatt 41:14968, 1962; Chemical Abstracts 61:6362, 1964)

3845 Porter, J.D., Ullmann, W.W., and Sanderson, W.W. (Union Coll., Schenectady, N.Y.): POLAROGRAPHIC SCANNING OF INDUSTRIAL WASTE SAMPLES. Purdue University, Engineering Bulletin, Extension Series 1959, 587-606 (Pub. 1960).

Rapid detection and determination of Cu, Pb, Ni, Cd, Zn, and Co in waste effluents was accomplished by use of a dropping Hg electrode polarograph. (From Chemical Abstracts 56:8486, 1962)

3846 Rao, V.K.M. (Central Drug Res. Inst., Lucknow, India): PAPER-CHROMATOGRAPHIC SEPARATION OF SILVER, LEAD, AND MERCUROUS MERCURY METALS. Journal of Scientific and Industrial Research (India) 19B:171-3, 1960.

Paper-chromatographic separations of Group I cations can be made by using simple inorganic solvents. The ions separate according to their relative rates of diffusibility. Pb can be estimated usually up to 9 μg concentration.

3847 Ro, I.H.: MICRODETERMINATION OF METALS BY SPECTROPHOTOMETRY. II. MICRODETERMINATION OF LEAD BY DITHIZONE METHOD. J. Pharm. Soc. Korea 5, No. 1:24-6, 1960.

The maximum absorption wavelength of dithizone-Pb complex in CCl_4 solution is 510 mμ. In the range of 5-120 Pb, Bouguer-Beer's law is valid. (From Chemical Abstracts 55:4244, 1961)

3848 Rottová-Kloubková, O., and Kalvoda, R. (Karlova Univ., Prague, Czechoslovakia): USE OF OSCILLOPOLAROGRAPHY IN QUANTITATIVE ANALYSIS. DETERMINATION OF LEAD IN THE BLOOD.) Pracovní Lékařství 12:20-3, 1960.

In the described method, protein-bound Pb in citrated blood samples is set free with diluted HCl, the precipitated proteins filtered off, the filtrate electrolyzed, the electrodes immersed into a solution of $KClO_3$ in dilute H_2SO_4, and the amount of Pb calculated by measuring the anodic curve on photographic recordings. (From Chemical Abstracts 54:19819, 1960)

3849 Strasheim, A., and Eve, D.J. (Natl. Phys. Res. Lab., Pretoria, Union of South Africa): DIRECT-READING SPECTROMETRIC DETERMINATION OF ZINC, COPPER, AND LEAD IN PLANT MATERIAL. Applied Spectroscopy 14:97-100, 1960.

The metals were separated by dithizone extraction from a solution of 1 g of the plant material. Standard deviation from the results of the mean of 2 arcings in each of 10 replicate analyses was 6.1% for Pb.

3850 Tani, R., and Vint, M.: (THE POSSIBILITIES OF THE SEPARATION OF TRACE ELEMENTS ZINC, CADMIUM, AND LEAD BY REDUCTION WITH HYDROGEN AT HIGH TEMPERATURE.) Uchenye Zapiski Tartusk. Gosudarst. Univ. 1960,

No. 95-135-9.
The stability, reproducibility, and accuracy of Gellmann and Nesh's method for the determination of Zn, Cd, and Pb in Latvian soils were investigated. This treatment incompletely separated Pb. (From Chemical Abstracts 55:27739, 1961)

3851 Truhaut, R., and Boudène, C. (Fac. Pharm., Paris): (MICROMETHOD FOR THE DETERMINATION OF LEAD IN BLOOD AND URINE.) Pharmacien Biologiste 2, No. 16:167-70, 1960.
Pb in blood or urine is determined colorimetrically with a solution of dithizone in $CHCl_3$ by visual comparison with a standard. (From Chemical Abstracts 54:19911, 1960)

3852 Van Erkelens, P.C.: RADIOMETRIC TRACE ANALYSIS OF LEAD. Utrecht, Netherlands, N.V. Smits, 1960, 104 pp.
This paperback volume is an English translation of a dissertation for the Doctorate degree. Though the purpose of the work was to develop methods for the determination of microgram quantities of Pb in biological material, the lowest level that could be determined was 1 ppm Pb. (From Journal of the Association of Official Agricultural Chemists 43:906-7 (Nov.), 1960)

3853 Vasin, A.V., and Kvitsin, Yu.P. (Vet. Res. Sta., Saratov, USSR): (ELECTROCAPILLARIMETRIC (ELECTROPHORETIC) DETERMINATION OF POISONOUS CHEMICALS IN BIOLOGICAL MATERIAL.) Veterinariya 37, No. 11:83-5, 1960.
Electrophoresis was used as an aid to the rapid diagnosis of poisoning of animals and birds by inorganic ions. Positive tests for certain anions and cations in dilutions of 1:10,000-1:100,000 were obtained in 3-30 min. Pb was 1 of the ions tested for and the reagent used was 1% KI or 10% K_2CrO_4 and 10% $K_2Cr_2O_7$. (From Chemical Abstracts 55:21229, 1961)

3854 Vouk, V.B., and Weber, O.A. (Inst. Med. Res., Zagreb, Yugoslavia): THE EXTRACTION CONSTANT OF LEAD DITHIZONATE. Analyst 85: 46-51 (Jan.), 1960.
The theoretical expression for the extraction constant defining partition equilibrium between metal in the aqueous phase and metal complex in the organic phase has been tested experimentally and found to be valid over a wide range of pH.

1961

3855 American Society for Testing Materials: STANDARD METHOD OF TEST FOR LEAD ANTIKNOCK COMPOUNDS IN GASOLINE. GRAVIMETRIC METHOD. ASTM Designation: D 526-61; POLAROGRAPHIC METHOD. ASTM Designation: D 1269-61. In 1961 ASTM Book of Standards, Part 7, Philadelphia, Pa., 1961, pp. 270-4; 679-84.
Both methods were revised in 1961. In the gravimetric method, Pb alkyl is converted to Pb chloride and extracted from the gasoline by refluxing with concentrated HCl. After evaporation of the acid extract to dryness and removal of any organic material by oxidation with HNO_3, Pb is determined gravimetrically as Pb chromate.
In the polarographic method known volumes of Cd chloride and gelatin solution are added to the acid extract and after dilution to a specific volume the Pb content of the solution is determined polarographically.

3856 Specht, E.W., and Opel, F.H. (Stickstoffwerk Piesteritz, Wittenberg, Germany): Bestimmung des Bleis in der für die Konservierung von Lebensmitteln verwendeten Ameisensäure mit der konventionellen und der "anodic-stripping" Polarographie. (POLAROGRAPHY IN THE FOOD INDUSTRY. I. LEAD DETERMINATION IN FORMIC ACID USED IN FOOD PRESERVATION, BY CONVENTIONAL AND ANODIC-STRIPPING POLAROGRAPHY.) Journal für Praktische Chemie 14, No. 4-6:298-304, 1961
A polarographic method for the determination of Pb in formic acid used for the preservation of foods is described. For Pb contents of <0.0001%, anodic-stripping polarography is used. The determination is carried out directly in the formic acid that has been diluted to ~50%. The method is rapid and precise, the standard error for 1 μg Pb/ml of solution being ±0.12 μg/ml.

3857 Baranov, V.I., and Gorbushina, L.V.: (QUANTITATIVE DETERMINATION OF RADIOACTIVE LEAD AND BISMUTH ISOTOPES IN THE ATMOSPHERE OF MINES.) Kernenergie 4, No. 2:154-5, 1961.

3858 Barreto, H.S.R., Barreto, R.C.R., and Pinto, I.P. (Rural Univ., Rio de Janeiro, Brazil): CHLORANILIC ACID AS A REAGENT IN THE PAPER CHROMATOGRAPHY OF INORGANIC COMPOUNDS. II. HEAVIER METALS. Journal of Chromatography 5:5-8, 1961.
The sensitivity of chloranilic acid as a reagent for the paper chromatography of some of the heavier metals is described. The sensitivity and color of the spot are tabulated for Pb and 9 other elements.

3859 Berman, E. (Illinois Masonic Hosp. Assoc., Chicago): DETERMINATION OF LEAD IN BLOOD. A SIMPLIFIED PROCEDURE APPLICABLE IN A ROUTINE CLINICAL LABORATORY. Technical Bulletin of the Registry of Medical Technologists 31:179-84 (Nov.), 1961; American Journal of Clinical Pathology 36:549-54 (Dec.), 1961.
A rapid method for the detection of Pb in whole blood, requiring <90 min is presented. The method consists of precipitation with trichloroacetic acid, formation of cyanide, extraction with dithizone and spectrophotometric comparison of the color complex formed. Differentiation between normal and pathologic concentrations by this method seems well defined. Levels in 100 apparently normal unexposed persons were <20 μg/100 ml, while levels in 118 untreated children, diagnosed as having Pb intoxication, ranged between 42 and 310 μg/100 ml.

3860 Bukharov, P.S., Fertman, V.K., and Koshkina, V.G.: (DETERMINATION OF HEAVY

METALS IN WINE BY A POLAROGRAPHIC METHOD.) Vinodelie i Vinogradarstvo SSSR 21, No. 7:32-4, 1961.
Ashes of 250 ml wine samples were dissolved in HCl and excess NH_4OH was added. Pb was determined polarographically in the precipitate. Results agree with chemical methods. (From Chemical Abstracts 57:9010, 1962)

3861 Larson, R. (Rhoangia Mine Serv. Res. Div. Kitwe, North Rhodesia): AN ION-EXCHANGE SEPARATION AND POLAROGRAPHIC DETERMINATION OF SMALL AMOUNTS OF LEAD AND ZINC IN THE PRESENCE OF COBALT. Analyst 86:198-200 (Mar.), 1961.

3862 Celap, M.B., Janjic, T.J., and Spanovic, Z. (Inst. Chem. Beograd, Yugoslavia): (DETERMINATION OF SMALL AMOUNTS OF METALLIC IONS ON IMPREGNATED FILTER PAPERS. I. DETERMINATION OF LEAD, ZINC, CADMIUM, AND IRON.) Glasnik Hem. Drustva, Beograd 25-26:527-9, 1960-1.
Filter paper was impregnated with $Ni_2[Fe(CN)_6]$. The determination was carried out with solutions containing 0.06-0.9 mg of the element present as NO_3^-. The movement of the double decomposition was a linear function of the amount of the particular ion. The calculated deviation was 3-5%, depending on the amount of ion present. (From Chemical Abstracts 59:5761, 1963)

3863 Condliffe, W.F., and Skrimshire, A.J.H. (Heinz Co. Ltd., London, England): POLAROGRAPHIC DETERMINATION OF COPPER, LEAD, TIN, AND ZINC IN FOODS. J. Polarog. Soc. 7, No. 1:10-14, 1961; Chemical Abstracts 56:5166, 1962.

3864 Cosoveanu, G.: (COLORMETRIC DETERMINATION OF LEAD IN WATER WITH DITHIZONE.) Farmacia (Bucharest) 9:677-80, 1961.
Full details concerning the title method are given. The buffer solution was not previously mixed with the dithizone solution. (From Chemical Abstracts 57:595, 1962)

3865 Costa, A.C.S. (Polytech. School, Univ. Bahia, Brazil): A QUALITATIVE TEST FOR LEAD WITH CHLORANILIC ACID. Mikrochimica Acta 5:701-3 (Sept.), 1961.
The reaction between Pb and chloranilic acid, in acidic medium, is proposed as a qualitative test for Pb.

3866 Dick, J.M., Ellis, R.W., and Steel, J. (Univ. Durham, England): A RAPID METHOD FOR THE MICRO-ESTIMATION OF LEAD IN URINE. British Journal of Industrial Medicine 18: 283-6 (Oct.), 1961.
A method is described for the determination of μg of Pb in small volumes of urine. Recoveries from urine samples of added Pb show that the mean results of triplicate analyses will, 19 times out of 20, lie within ±12.5 μg/l of true concentration. The determination of Pb in a single specimen of urine may be carried out in 3 hr.

3867 Ensslin, F., and Dreyer, H.: (LEAD DETERMINATION IN BLOOD AND ANIMAL ORGANS.) Z. Erzbergbau u. Metallhüttenw. 14:388-94, 1961.
A critical evaluation by 5 laboratories of the polarographic, photometric with dithizone, and spectrographic determinations is presented. For pig blood all 3 methods agree within ordinary limits of analytical error. Greater deviations are obtained in analysis of liver, kidney and bone, which are due to variations in distribution of Pb in these tissues. For a given laboratory, the range of values seldom exceeds ±10-12%. (From Chemical Abstracts 55:27511, 1961)

3868 Filippova, N.A., and Korosteleva, V.A.: (PHASE ANALYSIS OF LEAD-ZINC DUSTS CONTAINING CALCIUM COMPOUNDS.) Sb. Nauchn. Tr., Gos. Nauchn.-Issled. Inst. Tsvetn. Metal. 1961, No.18:146-54; Chemical Abstracts 60:2599, 1964.

3869 Gibson, W.M. (Bell Tel. Lab., Murray Hill, N.J.): THE RADIOCHEMISTRY OF LEAD. National Academy of Sciences, National Research Council, Nuclear Science Series NAS-NS 3040, August 1961, 158 pp.
The monograph deals with the inorganic, analytic, and radiochemistry of Pb, isotopes of Pb, and other subjects of special interest to radiochemists. The various methods and techniques of Pb analysis are described.

3870 Hara, S. (Osaka Ind. Res. Inst., Japan): (EDTA TITRATION OF Zn AND Pb WITH DITHIZONE INDICATOR AND MASKING OF Pb WITH 3-MERCAPTOPROPIONIC ACID.) Bunseki Kagaku 10:633-6, 1961.
Zn and Pb in 40% alcohol at pH 4.5 were determined by titration with 0.025M EDTA by using 2 ml of 0.025% dithizone as an indicator. (From Chemical Abstracts 56:17, 1962)

3871 Henderson, S.R., and Snyder, L.J. (Ethyl Corp., Baton Rouge, La.): RAPID SPECTROPHOTOMETRIC DETERMINATION OF TRIETHYLLEAD, DIETHYLLEAD, AND INORGANIC LEAD IONS, AND APPLICATION TO THE DETERMINATION OF TETRAORGANOLEAD COMPOUNDS. Analytical Chemistry 33:1172-5 (Aug.), 1961.
A method for the simultaneous determination of triethyl and diethyl Pb and inorganic Pb ions, by the dithizone technique is described. Results show a precision for anyone of the 3 forms of Pb in a mixture of ±4% of the amount present at the 100 μg level. Tetraorganolead compounds may be measured in their ionic form with a precision of ±1.3% of the amount present. The procedure for the determination of TEL is also described. The method can be used for the determination of organolead compounds in storage stability tests of antiknock blends under various conditions and with various additives.

3872 Henry, W.M., and Loveridge, B.A.: THE DETERMINATION OF LEAD-210 IN HARWELL EFFLUENT. United Kingdom Atomic Energy Authority AERE-R-3795, 1961, 26 pp.
The method used at Harwell Atomic Energy Research establishment to determine ^{210}Pb in waste waters

is described. (From Water Pollution Abstracts 35, Abstr. No. 1207, 1962)

3873 Herrmann, M.: (DETERMINATION OF COPPER, LEAD, AND ZINC IN ROASTING RESIDUE AND FLUE DUST.) Rev. Universelle Mines 17: 257-9, 1961.

The determination can be carried out with X-ray emission spectral analysis within 45 min with sufficient accuracy. A reproducible distribution of the analysis substance in the sample carrier can be obtained by the emulsifying method. For the determination of Cu, Pb, and Zn a sample of 2.0 g is needed. The emulsion produced from that is filled into the sample carrier. A Mo tube is used for excitation at 30 kv and 10 ma. Details of the method are given. (From CZ 1963, No. 5:1793-4; Chemical Abstracts 61:3677, 1964)

3874 Hill, W.H., Hengstenberg, F.H., and Sharpe, C.E. (Univ. Pittsburgh, Pa.): DETERMINATION OF LEAD IN URINE BY AN ION EXCHANGE METHOD. American Industrial Hygiene Association Journal 22:430-3 (Dec.), 1961.

An ion exchange method for the determination of Pb in urine is described which involves (1) the automatic feeding of urine into an ion exchange column; (2) the concentration of Pb from urine by a suitable resin; (3) the elution of Pb from the resin by an acid, and (4) the subsequent determination of Pb by an acceptable method. The results obtained by this method from the urines of Pb-exposed persons compare favorably with results obtained by other methods. Recovery in Pb-spiked urine is 90-100%. (From authors' abstract)

3875 Horiuchi, K.: A SIMPLE SYNTHETIC DIAGNOSTIC METHOD FOR LEAD POISONING. In Proceedings 13th International Congress on Occupational Health, New York, July 25-29, 1960 (published 1961), pp. 288-9.

The method presented for the determination of mild or latent Pb poisoning in mass screening is based on 3 or 4 laboratory routine tests: erythrocyte counts, hemoglobin, and urinary coproporphyrin and perhaps stippled cell count. (From author's abstract)

3876 Jacobs, M.B., and Herndon, J. (Columbia Univ., New York, N.Y.): SIMPLIFIED ONE COLOR DITHIZONE METHOD FOR LEAD IN URINE. American Industrial Hygiene Association Journal 22:372-6 (Oct.), 1961.

By substitution of α-naphtholphthalein as the indicator instead of phenol red and the use of a single Mojonnier extraction tube or Jacobs-Singer separatory flask instead of multiple separatory funnels, the manipulative steps of the one color dithizone method for Pb are simplified and improved. The method presented is adequate for 0.25 μg Pb.

3877 Judd, S.H., and Tebbens, B.D. (Univ. Calif., Berkeley, Calif.): AIR SAMPLING AND ANALYSIS OF LEAD ON PAPER. American Industrial Hygiene Association Journal 22:86-9 (Apr.), 1961.

A new procedure for the analysis of air-borne Pb, based on chromatography, is described. Samples collected on filter paper tape are treated with HCl-butanol reagent to prepare the chromatogram. Spraying with a dithizone reagent develops the color. The system is also applicable to other metals.

3878 Kapitanov, Yu.T., Serdyukova, A.S., and Korenkov, A.P. (S. Ordzhonikidze Inst. Geol. Prospecting, Moscow, USSR): (RAPID DETERMINATION OF THE CONCENTRATION OF POLONIUM-218 AND THE RATIO OF THE DECOMPOSITION PRODUCTS OF RADON IN AIR.) Izv. Vysskikh Uchebn. Zavedenii, Geol. i Razvedka 4, No. 11:106-14, 1961.

A discussion is given of a method proposed for determining rapidly (in 13 min) and accurately (±10%, at 10^{-10} Ci/l) the concentration of ^{218}Po and the ^{218}Po:^{214}Pb:^{214}Bi ratio in air. (From Chemical Abstracts 58:380, 1963)

3879 Kaplan, E., and Shaull, R.S. (Baltimore City Health Dept., Md.): DETERMINATION OF LEAD IN PAINT SCRAPINGS AS AN AID IN THE CONTROL OF LEAD PAINT POISONING IN YOUNG CHILDREN. American Journal of Public Health 51:65-9 (Jan.), 1961.

A simple and inexpensive procedure is described for rapidly screening paint scrapings for their Pb content at the 1% level to be used to determine compliance with public health regulations set up to prevent Pb paint poisoning in children. In principle, a 25-mg sample of paint scrapings is digested with a nitric acid solution and Pb is precipitated as I.

3880 Kawashiro, I., Kawada, K. and Amano, R.: (4-(PYRIDYLAZO)-RESORCINOL AS AN ANALYTICAL REAGENT FOR THE COLORIMETRIC DETERMINATION OF LEAD IN FOOD.) Bulletin of National Institute of Hygienic Sciences (Tokyo) 79:87-9 (Sept.), 1961.

3881 Kemula, W., and Kublik, Z. (Polish Acad. Sci., Warsaw, Poland): USE OF THE MERCURY DROP ELECTRODE METHOD FOR DIRECT EVALUATION OF MINUTE AMOUNTS OF Pb IN URINE. Nature (London) 189:57-8, 1961.

The solution is electrolyzed at -0.7 volts for 3 min. After this time the oxidation curves are recorded from -0.7 to -0.2 volts. By comparing with standard curves, concentrations as low as 10 μg/l can be determined.

3882 Khrustaleva, V.A.: (PLUMBONE FOR DETERMINATION OF LEAD.) Metody Opred. Vredn. Veshchestv v Vozdukhe, Moscow, Sb. 1961, 105-12.

For the photometric determination of Pb, the reaction with plumbone is very sensitive, the color is stable, plumbone solutions can be stored over long periods, and results have good reproducibility. A method is given for determining TEL in air and for preparing a visual scale for determination of TEL in air. (From Ref. Zh., Khim. 1962, Abstr. No. 18D77; Chemical Abstracts 58:8403, 1963)

3883 Klimov, I.T., and Eremenko, V.Ya. (Hydrochem. Inst., Novocherkassk, USSR): (SPECTROGRAPHIC DETERMINATION OF TRACE ELEMENTS IN NATURAL WATERS. IV. DETERMINATION OF

Ni, Co, Ag, Cu, V, Sn, Mo, Ti, Al, Bi, Fe, Pb, AND Mn WITH Na DIETHYLDITHIOCARBAMATE AND 8-QUINOLINOL.) Gidrokhim. Materialy 31:191-6, 1961.

Thirteen elements including Pb, can be determined spectrographically in 1 sample of water by the extraction of the element into $CHCl_3$ and subsequent treatment with 5% aqueous Na diethyldithiocarbamate and with 0.1% 8-quinolinol in $CHCl_3$. (From Chemical Abstracts 55:26318, 1961)

3884 Koirtyohann, S.R., and Feldman, C.: STABLE ELEMENT METABOLISM BY MAN. THE SPECTROGRAPHIC DETERMINATION OF TRACE ELEMENTS IN HUMAN TISSUE. In Morgan, K.Z.: Health Physics Division Annual Progress Report for Period Ending July 31, 1961. US Atomic Energy Commission Document No. ORNL-3189:197-202 (July 31), 1961.

A spectrographic method for the determination of trace elements in human tissues is described. The dried tissues were pulverized on an impact shaker. The limits of detection for Pb in ash, using a quantometer, were 26 ppm. When photographic light detection was used, this limit was 5 ppm. Samples of brain, heart and diaphragm from 28 autopsies from San Francisco were analyzed and the following data for Pb (μg/g of ash) were obtained for semiquantitative and quantitative estimates, respectively: brain 5-10, 460-1170; diaphragm 5-30, 34-430; heart 5-20, --.

3885 Kopeikin, Yu.A., and Zagarskikh, T.I.: (SILICA BUFFER FOR QUANTITATIVE SPECTRAL ANALYSIS OF SOILS, PLANTS, AND ANIMAL TISSUES.) Mikroelementy v Pochvakh, Vodakh i Organizmakh Vost. Sibiri i Dal'nego Vostoka i ikh Rol v Zhizni Rast., Zhivotnykh i Cheloveka, Akad. Nauk SSSR, Sibirsk. Otd., Tr. Pervoi Konf., Ulan-Ude 1960: 258-62 (Pub. 1961).

An air-stabilized 18-20 amp ac arc is used for excitation. About 2000 samples of soils, plants, and animal tissues were analyzed. The samples were dried at 105° to constant weight, ashed at 450° for 2 hr, the ashed material mixed with 10 times its weight of SiO_2, and excited. A vibrator was employed to spread the powdered sample and form the arc during the exposure. Fe, Mg, Ni, Pb, Co, Mn, Sr, Zn, Mo, Al, P, Ca, Cd, and U were determined simultaneously. A table of data, and absolute and relative errors for soils and Mo and Cu ores is presented. (From Chemical Abstracts 59:10745, 1963)

3886 Krasnaya, B.Ya.: (NEW PROCESS FOR LEAD DETERMINATION IN PRESERVES.) Konserv. i Ovoshchesushi. Prom. 16, No. 3:35-6, 1961.

A photocolorimetric method for the determination of Pb is proposed. The colorimetric method described permitted the determination of ≥0.01 mg Pb in ∿1 hr (duration of ashing of the sample not included) with an accuracy of ±10%. (From Chemisches Zentralblatt 1962, No. 44:16169; Chemical Abstracts 61:4878, 1964)

3887 Kublik, Z. (Polish Acad. Sci., Warsaw, Poland): (APPLICATION OF THE HANGING-DROP MERCURY ELECTRODE FOR DETERMINATION OF TRACES OF COPPER, LEAD, AND CADMIUM IN WATERS.) Acta Chim. Acad. Sci. Hung. 27: 79-86, 1961.

The hanging-drop Hg electrode makes possible the determination of Cu, Pb, and Cd in waters at concentrations of 10^{-8}M. The possibilities and difficulties of this method applied to analysis of different waters are discussed. (From Chemical Abstracts 55:22668, 1961)

3888 Landry, A.S. (International Cooperation Admin., USOM to Peru, Lima): INTERLABORATORY EVALUATION OF METHODS IN OCCUPATIONAL HEALTH CHEMISTRY--THE DETERMINATION OF LEAD AND QUARTZ IN LATIN AMERICA. In Proceedings 13th International Congress on Occupational Health, New York, July 25-29, 1960 (published 1961), pp. 512-9.

It was the opinion of the author that an international committee should be formed to establish testing procedures and periodically evaluate analytical methods by statistical means. To support this the author presented statistical evaluation of data (quartz in synthetic mineral mixtures and Pb in blood) obtained in various Latin American occupational health laboratories. A replicated series of blood samples were analyzed for Pb in each of 5 Latin American countries to study the precision attainable. The samples were prepared in random order from citrated whole blood by transferring known volumes of a standard Pb solution prepared in all cases from stock Pb nitrate solution. Pb concentration in each sample was also determined in random order by the method of Bambach and Burkey (1942). Amounts of Pb added (excluding the unreliable results of 2 laboratories) and averaged amounts found in μg, respectively, were: 4.0, 3.84; 8.0, 7.91; 12.0, 12.25; 16.0, 16.21; 20.0, 20.14.

Using a variance test and a joint confidence ellipse, the author showed that the data of 2 laboratories were not compatible with the respective least square values determined from the average results of the other 3 laboratories. Based on pooled results of the 3 laboratories showing homogeneity, the author was able to determine a least-squares fit to the standard curve for the analysis of Pb in blood. Thus, from the data presented, along with that from the quartz analyses, the author felt he had justifiably demonstrated that well-established procedures, even when used by trained personnel, to say nothing of untrained or new workers, may result in data that are erroneous.

3889 National Lead Co., Inc., Winchester Laboratory (Mass.): QUARTERLY PROGRESS REPORT (ON WASTE DISPOSAL AND PROCESSING), OCTOBER 1, 1960-DECEMBER 31, 1960. US Atomic Energy Commission Document No. WIN-121, 1961, 40 pp.

The report includes procedures used for the determination of ^{223}Ra by ion exchange separation and counting daughter ^{211}Pb, and the determination of ^{210}Pb in soil. (Nuclear Science Abstracts 15:Abstr. No. 15321, 1961)

3890 Nifontova, M.V., and Ternovskaya, L.N. (F.F. Erisman Inst. Hygiene, Moscow, USSR): (SPECTROGRAPHIC METHOD FOR DETERMINATION OF LEAD IN BLOOD.) Lab. Delo 7, No. 12:13-17, 1961.

Pb was determined at concentrations of 0.0008, 0.001, and 0.02 μg/ml blood, using the ISP-22 apparatus. The mean error was 8.8%. (From Chemical Abstracts 56:15766, 1962)

3891 Oka, S. (Shimadzu Seisakusho Ltd., Kyoto, Japan): (MICRODETERMINATION OF SOME METAL IONS BY POTENTIAL-STEP VOLTAMMETRY.) Nippon Kagaku Zasshi 82:1202-6, 1961.

The newly devised method was applied to the determination of Pb and other metal ions. The sensitivity was 500 times greater than the ordinary dc polarographic method. (From Chemical Abstracts 57:15776, 1962)

3892 Okusa, H., and Tada, O. (Inst. Sci. Labour, Tokyo, Japan): (ON THE DETERMINATION OF INJURIOUS SUBSTANCES AND THE LEVEL OF HEAVY METALS IN BLOOD.) Rep. Inst. Sci. Labour 1961, No. 58:35-6.

Microanalytical methods are described for the practical field measurements of heavy metals in gases, vapors, fumes, smokes, dusts, and mists. Normal Japanese blood levels of Pb are given. (From Chemical Abstracts 56:13201, 1962)

3893 Pevtsov, G.A., and Manova, T.G. (All-Union Sci. Res. Inst. Chem. Reagents, Moscow, USSR): (DETERMINATION OF TRACE IMPURITIES IN SODIUM CHLORIDE AND POTASSIUM CHLORIDE AND IN TARTARIC ACID.) Zh. Analit. Khim. 16:720-3, 1961.

A spectrographic method was proposed for the determination of Pb and other trace impurities in NaCl, KCl and tartaric acid. (From Chemical Abstracts 57:7886, 1962)

3894 Phillips, G.J., and Lewin, V.H.: POLAROGRAPHIC DETERMINATION OF METALS IN SEWAGE AND SEWAGE SLUDGES. Effluent Water Treat. J. 1, No. 4:226-32, 1961.

Preliminary studies were carried out on the methods for simultaneous determination of various elements, including Pb. N HCl buffer was used for simultaneous determination of Cu, Pb, Cd, and Zn in the presence of Fe and Cr. By use of 0.01% gelatin/phenol suppressor and N_2, good reproducibility was obtained, the error in the range 1-5 ppm being for Cu, Pb, and Cd, respectively, ±4.3, 3.2, and 7.0%. The use of nitrilotriacetic acid as base electrolyte (4% weight/volume in 12.5% aqueous NH_3) was unsuitable owing to much interrelation of metals. The methods of preliminary treatments of sewage and sewage sludges in preparing samples for polarographic determination were discussed, concluding that the currently accepted methods of organic matter destruction are subject to losses while the controlled decomposition procedure is too time consuming. Discrepancies were observed in preparation of sludges by acid digestion or ashing of identical samples. (From Chemical Abstracts 58:9950, 1963)

3895 Pometun, E.A.: (SPECTROSCOPIC DETERMINATION OF COPPER AND LEAD IN SOILS.) Dokl. Akad. Nauk Tadz., SSR 4, No. 3:23-7, 1961.

The method permits determination of 0.001-0.3% Pb with an accuracy of ±3.5%. (From Chemical Abstracts 56:13539, 1962)

3896 Rainsford, S.G. (H.M. Med. Insp. Factories Great Britain): PATHOLOGIC AIDS IN THE SUPERVISION OF LEAD WORKERS. In Proceedings 13th International Congress on Occupational Health, New York, July 25-29, 1960 (published 1961), pp. 345-8.

A formula for calculating the daily coproporphyrin (CP) excretion from a single spot sample is presented. It involves using a hypothetical figure for specific gravity (1.016) assuming that 1500 ml of urine is eliminated in any 24 hr, and then correcting findings accordingly. However, if albumin and sugar are present, an additional correction factor must be applied since every 0.4 g protein or 0.27 g glucose/100 ml urine raises specific gravity by 0.001. Four Pb workers (A-D) were used to test this method by collecting 3 separate specimens from each on the same day. Specific gravity, real values, and values for specific gravity of 1.016, respectively, were: A, 1.016, 1632 mg/1, 1632 mg/1; 1.019, 1800, 1516; 1.021, 1260, 960; B, 1.018, 1188, 1066; 1.009, 648, 1152; 1.014, 840, 960; C, 1.026, 326, 201; 1.024, 412, 274; 1.024, 518, 345; D, 1.015, 199, 212; 1.003, 25, 133; 1.002, 15, 120. It can be seen that results can only have a limited degree of accuracy, but the author feels the method is adequate for all practical purposes.

A simple inexpensive method for quantitative CP determination in urine is also described. A series of dilutions ranging from 1/2 to 1/24 using distilled water as the diluent were made from 3 samples of urine in which the concentration of CP was known, the total volume of urine and diluent in each tube being 1.0 ml. To each tube was then added 0.4 ml glacial acetic acid and 1 drop water. After shaking the mixture in each tube, it was extracted with 1.0 ml ether and allowed to stand in daylight for 12 hr, after which the results were read under ultraviolet lamp. Results closely approximated the quantity actually known to be present. In 1 test, titer values and real values, respectively, in μg/1 were: 1600, 1830; 1200, 1188; 600, 648. A 2nd series of 9 samples substantiated these results.

3897 Rozenfel'd, A.S.: (SIMULTANEOUS DETERMINATION OF SMALL QUANTITIES OF COPPER, LEAD, AND ZINC.) Tr. Leningr. Sanit. Gigien. Med. Inst. 69:144-9, 1961.

The method is described. The half-wave potential for Pb is 0.55 v; 0.1 mg Pb/1 can be determined. (From Chemical Abstracts 58:12294, 1963)

3898 Rusin, N.M., and Rabinovich, V.F.: COMPARISON OF THE PRECIPITATION OF HEAVY METALS WITH GASEOUS HYDROGEN SULFIDE AND WITH SODIUM SULFIDE. Gigiena i Sanit. 26, No. 1:66-9, 1961.

A method for the determination of Pb and Cu in foods is described. (From Chemical Abstracts 55: 12685, 1961)

3899 Samuel, B.W., and Brunnock, J.V. (The British Petroleum Co., Middlesex, Eng-

land): POLAROGRAPHIC METHOD FOR PARTS PER BILLION OF COPPER AND LEAD IN CATALYTIC REFORMER FEEDSTOCKS. Analytical Chemistry 33, No. 2:203-5 (Feb.), 1961.
The square wave polarograph is applied for the simultaneous determination of Pb and Cu in concentrations <20 ppb with an accuracy of ±2 ppb for Pb.

3900 Schäfer, H. (Acad. Sci., Berlin, Germany): Papierchromatographischer Nachweis einiger symmetrischer und asymmetrischer Alkylbleiverbindungen. (PAPER-CHROMATOGRAPHIC DETECTION OF SOME SYMMETRIC AND ASYMMETRIC LEAD ALKYLS.) Zeitschrift für Analytische Chemie 180:15-18, 1961.
Treatment of R_4Pb with Br or Cl at -60° yields R_3PbX. Mixtures of the latter can be separated by paper chromatography by using cyclohexane or C_6H_6-cyclohexane acetic acid for development. Cl^- salts are separated more easily than Br^- salts.

3901 Schmitz, B. (Andreae-Noris Zahn A.-G., Frankfurt, Germany): (COMPLEXOMETRIC TITRATION OF PHARMACEUTICAL LEAD AND ZINC COMPOUNDS AND PREPARATIONS.) Deutsche Apotheker-Zeitung Vereinigt mit Sueddeutsche Apotheker-Zeitung 101:1673-7, 1961.
The Pb or Zn in 8 official D.A.-B VI and 1 nonofficial pharmaceutical Pb compound was determined.

3902 Sereda, G.A., and Vorontsova, A.S.: (DETERMINATION OF LEAD IN URINE BY THE ION-EXCHANGE METHOD AND WITH THE AID OF A NEW SULFARSAZEN REAGENT.) Vopr. Gigieny, Fiziol. Truda, Prof. Patol., i Prom. Toksikol., Sverdlovsk, Sb. 6:412-5, 1961.
A modification of the Matukhova method for the quantitative determination of Pb in urine is given. Sensitivity of the method is 1 μg Pb in 50 ml urine. (From Chemical Abstracts 59:12075, 1963)

3903 Shtukovskaya, L.A., and Yazhemskaya, V.Ya. (E.F. Erisman, Sci. Res. Inst. Hyg., Moscow, USSR): (APPLICATION OF POLAROGRAPHY TO SANITARY WATER EXAMINATION.) Gigiena i Sanit. 26, No. 3:55-7, 1961.
Determination of Pb requires concentration by coprecipitation with $CaCO_3$ and solution of the precipitate in HNO_3 before polarographic determination. Details of the analysis are given. (From Chemical Abstracts 55:21427, 1961)

3904 Singh, E.J., and Dey, A.K. (Univ. Allahabad, India): SEPARATION AND MICROIDENTIFICATION OF METALLIC IONS BY RING OVEN TECHNIQUE. I. OXALATE AS A COMPLEXANT. Mikrochim. Acta 1961:366-9.
Rapid qualitative separations of various groups of ions, including Pb^{++}, are described. (From Chemical Abstracts 56:916, 1962)

3905 Singh, E.J., and Dey, A.K. (Univ. Allahabad, India): SEPARATION AND IDENTIFICATION OF MICRO QUANTITIES OF METALLIC IONS BY THE RING OVEN TECHNIQUE. III. EDTA AS A COMPLEXANT. Z. Anal. Chem. 183:248-51, 1961; Chemical Abstracts 56:6638, 1962.

3906 Sinyakova, S.I., and Markova, I.V.: (DETERMINATION OF TRACES OF LEAD, COPPER, AND ZINC IN ALKALIES AND ACIDS BY AMALGAMATION POLAROGRAPHY ON A MERCURY DROP.) Zavodskaya Lab. 27:521-5, 1961.
Pb, Cu, and Zn impurities in very pure NaOH and HCl were determined by hanging-Hg-drop electrode polarography. (From Chemical Abstracts 56:6648, 1962)

3907 Snyder, L.J., and Henderson, S.R. (Ethyl Corp., Baton Rouge, La.): A NEW FIELD METHOD FOR THE DETERMINATION OF ORGANOLEAD COMPOUNDS IN AIR. Analytical Chemistry 33:1175-80 (Aug.), 1961.
A simplified field method permits the rapid determination of several organolead compounds in air. The method utilizes as a scrubber a small disposable glass tube containing I crystals supported by 2 glass wool plugs. Data are presented to show relative reaction rates and intermediate products obtained from reacting tetraorganolead compounds with aqueous I in conventional scrubbers.

3908 Strasheim, A., and Eve, D.J. (S. African Council Sci. Ind. Res., Pretoria): THE CHEMICAL CONCENTRATION AND SPECTROGRAPHIC DETERMINATION OF CERTAIN MINOR TRACE METALS IN PLANT MATERIAL. J. S. African Chem. Inst. 14:1-15, 1961.
A method is described for the separation and the spectrographic determination of trace amounts of Zn, Co, Ni, Pb, Ti, V, and Mo in plant material. Pb has a CoV of 22. (From Chemical Abstracts 55: 26859, 1961)

3909 Toropov, S.A., Mizgareva, V.V., and Gol'dina, Ts.A.: (X-RAY METHOD FOR DETERMINING QUARTZ AND LEAD IN AEROSOLS OF THE ATMOSPHERE OF INDUSTRIAL AREAS.) Sb. Nauchn. Rabot Inst. Okhrany Truda Vses. Tsentr. Soveta Professional'n. Soyuzov 1961, No. 5:94-8.
With this method crystalline silica can be accurately determined in the presence of amorphous silica. This cannot be done by a chemical method. (From Réf. Zh., Khim. 1962, Abstr. No. 14I398; Chemical Abstracts 58:3820, 1963)

3910 Tyukhteneva, S.N.: (RAPID MINERALIZATION OF URINE IN ANALYZING FOR LEAD.) Gigiena i Sanit. 26, No. 1:63-6, 1961.
This method involves treatment with $HClO_4$. There appears to be less loss of Pb. (From Chemical Abstracts 55:12526, 1961)

3911 US Public Health Service, Sanitary Engineering Center: ANALYTICAL REFERENCE SERVICE. AIR-LEAD NUMBER 1. Cincinnati, Ohio 1961, 13 pp.
A study was conducted to evaluate the accuracy of the methods currently used in the measurement of Pb in the atmosphere. Air-Pb samples were prepared on filter paper tape to simulate the appearance of filters through which 1 m^3 air had been passed. Pb was added in amounts found in samples above street level during moderate traffic conditions. Each sample consisted of 5 Pb-impregnated spots and adjacent blanks. Pb was then determined by various methods of extraction and analytical procedures (spectrographic and dithizone methods).

The mean and percentage of deviation of all results obtained were then calculated. The nitric acid wet ashing method for extraction together with a mixed color dithizone procedure was the method of choice for determining Pb on filter paper in the 0.10 µg range.

3912 Vanderkolk, A.L., and Vanfarowe, D.E. (Michigan Dept. Health, Lansing): SPECTROGRAPHIC DETERMINATION OF LEAD IN WHOLE URINE. American Industrial Hygiene Association Journal 22:368-71 (Oct.), 1961.

A method is presented for the determination of Pb in urine without requiring the ashing of the urine. As internal standard, In, is used in preference to Bi. A N atmosphere is introduced around the sample electrode to minimize the wandering of the arc around the rim of the electrode and to lower the spectral background on the plate. The accuracy of the method averaged ±0.013 mg Pb/l urine with a maximum deviation of ±0.03 mg Pb/l urine. It was developed for the use in analytical laboratories which require a high degree of versatility.

3913 Van Erkelens, P.C. (Res. Inst. Animal Husbandry, Utrecht, Netherlands): CONCENTRATION AND SEPARATION OF THE TRACE ELEMENTS Fe, Cu, Zn, Mn, Pb, Mo, AND Co. II. SOLVENT EXTRACTION. III. PAPER CHROMATOGRAPHY. Analytica Chimica Acta 25:129-35; 226-32, 1961.

II. A combination of acetylacetone and diethyldithiocarbamate allows the separation of traces of Pb, among other elements, from the macroconstituents of ash of biological matter.

III. The determination of trace elements, including Pb, in biological ash is described.

3914 Van Erkelens, P.C. (Res. Inst. Animal Husbandry, Utrecht, Netherlands): RADIOMETRIC TRACE ANALYSIS. QUANTITATIVE PAPER CHROMATOGRAPHY OF LEAD WITH PHOSPHATE-P^{32}. Analytica Chimica Acta 25:570-8, 1961.

The determination of 1-4 µg Pb^{++} in biological materials by paper chromatography is described.

3915 Vasina, N.T.: (GRAVIMETRIC DETERMINATION OF SMALL AMOUNTS OF LEAD BY MEANS OF CHROMOUS SALT SOLUTIONS.) Zhur. Anal. Khim. 16:241-2, 1961; Chemical Abstracts 56:926, 1962)

3916 Willis, J.B. (Chem. Res. Lab., Melbourne, Australia): DETERMINATION OF LEAD IN URINE BY ATOMIC ABSORPTION SPECTROSCOPY. Nature 191:381-2 (July 22), 1961.

The atomic absorption method described utilizes the quantitative extraction of Pb from urine by ammonium pyrrolidine dithiocarbamate (Malissa and Schöffmann, 1955) and methyl n-amyl ketone at a pH sufficiently low (1.5-4.5) to avoid precipitation of the phosphates. Since only the concentration of Pb in the ketone phase is required, the partial emulsification which invariably occurs does not affect the accuracy of the determination. Recovery of added Pb from normal urine and results of the method with those by the dithizone method were in satisfactory agreement. The method is well suited for measurement of very low Pb concentrations (<0.1 ppm) since it is specific for Pb and yields a negligible blank value. By using larger volumes of urine (100-200 ml) it is possible to measure a Pb concentration of 0.02 ppm with a SD of 0.002 ppm. The method is also applicable to other heavy metals.

3917 Wynne, E.A., Burdick, R.D., and Fine, L.H. (Fisher Sci. Co., Fair Lawn, N.J.): LEAD DETERMINATION USING AN ANION EXCHANGER AND SODIUM CHLORANILATE. Analytical Chemistry 33:807-8 (May); 1963 (Dec.), 1961.

This is a general method, combining the techniques of Strel'nikova and Pavlova (1960), Frost-Jones and Yardley (1952), and Ferro and Ham (1957). Pb is converted to anionic complex with HCl, adsorbed on a strongly basic anion exchanger, and eluted with distilled water. Pb is precipitated with 1% aqueous Na chloranilate, and 5% Na_2EDTA is used to release the acid chloranilate ion by chelation of Pb; results are read on a spectrophotometer at 530 mµ vs a reagent blank. The curve is linear for 50-250 µg Pb. Due to the fact that Pb chloranilate did not precipitate in the substrate used, <50 µg could not be determined. Solubility tests of Pb chloranilate in various solvents indicated that by increasing the concentration of methyl or butyl Cellosolve, the range <50 µg could be analyzed. This would give toxicologists and industrial hygienists a less tedious method than the dithizone.

In the later article (by Wynne and Burdick), the authors used a salting-out effect which made the procedure applicable to concentrations <50 ppm, using the original substrate.

3918 Yoshida, K., Hosokawa, A., and Yoshida, S.: ON THE MICRODETERMINATION OF LEAD BY DITHIZONE METHOD WITH SPECIAL REFERENCE TO CONTAMINATION WITH REAGENTS USED FOR DETERMINATION. Mie Med. J. 11:17-20 (May), 1961.

For the determination of Pb in urine, Japanese commercial reagents or partially purified reagents gave satisfactory blanks. For the determination of Pb in blood, purification of reagents and washing of hypodermic needles with NaCN-dithizone-$CHCl_3$ was desirable. (From Chemical Abstracts 57:3726, 1962)

1962

3919 Abbott, D.C., and Harris, J.R. (Dept. Sci. Ind. Res., London, England): THE DETERMINATION OF TRACES OF LEAD IN DRINKING WATER. Analyst 87:387-9 (May), 1962

A rapid method for the determination of Pb in drinking water, suitable for routine use, with a precision of ±1 µg within the range of 0-25 µg is described.

3920 Abbott, D.C., and Waters, W.F.: A RAPID SORTING TEST FOR LEAD AND COPPER IN DRINKING WATER. Proc. Soc. Water Treatm. Exam. 11:66, 1962.

The procedure is based on the fact that while Cu dithizonate is extractable from acid solution by C tetrachloride, Pb dithizonate is not; however, the addition of K cyanide destroys the Cu complex while rendering the Pb dithizonate extractable by the solvent. The method is applicable to waters containing both metals, although such waters occur infrequently. There is no interference from up to 3 ppm Cl, 3 ppm chloramine, 2 ppm Fe, 40 ppm Zn, or 350 ppm alkalinity; if the alkalinity is >350 ppm, however, it is necessary to add 4 ml acid hydroxylamine reagent to avoid interference from Zn. (From Water Pollution Abstracts 36:Abstr. No. 1260, 1963)

3921 Ballinger, D.G., and Hartlage, T.A. (Robert A. Taft San. Eng. Center, Cincinnati, O.): POLAROGRAPHIC DETERMINATION OF METALS IN WATER, WASTES, AND BIOLOGICAL SAMPLES. Water and Sewage Works 109:338-41, 1962.

Samples of water were prepared by evaporation of 100 ml to dryness, and of sewage and biological materials by drying and ashing at 600°. Pb was determined in 10 ml of electrolyte containing 0.2 g gelatin, 10 ml concentrated HCl, and 75 g KCl/l. N was used to remove O. Results are similar to those of colorimetric procedures but the procedure is simpler. (13 references)

3922 Bank, G.I.: (DETERMINATION OF MANGANESE, ARSENIC, AND LEAD COMPOUNDS PRESENT TOGETHER IN FACTORY AIR.) Novoe v Oblasti Sanit.-Khim. Analiza, (Raboty po Prom.-Sanit. Khim.) 1962:240-1.

The air was aspirated through weighed ashless filter paper at 6-8 l/min for 20-30 min. The paper was dried over H_2SO_4 and weighed, giving the dust concentration in mg/m^3. After treatment of the filter paper with H_2SO_4, Pb was determined as $PbCrO_4$. (From Chemical Abstracts 59:9312, 1963)

3923 Belyaev, V.P., Kalinachenko, V.R., Kuz'min, N.M., and Yakimenko, L.M.: (CHEMICAL-SPECTRAL ANALYSIS OF HIGH-PURITY WATER.) Zavodskaya Laboratoriya 28:685,1962.

Trace contaminants are removed from 250 ml water by 3-4-fold extraction with 2% aqueous Na diethyldithiocarbamate and 7 ml $CHCl_3$. The extraction is evaporated on spectrally pure graphite powder. The following analytical lines are used for the determination: [illegible] 3920.640, Pb 2833.065, Sn 2839.989, Ni 3050.819, Ag 3280.683, Cu 3273.962, Sb 2598.062 A. The sensitivities are: Fe 10^{-7}, Mn and Ag 6 x 10^{-9}, Pb and Sn 6 x 10^{-8}, Ni and Sb 2 x 10^{-7}, Cu 5 x 10^{-8}%.

3924 Blum, M.S., Sleva, S.F. and Kelso, F.S. (R.A. Taft Sanit. Eng. Center, Cincinnati, Ohio): AN EVALUATION OF ANALYTICAL METHODS FOR THE DETERMINATION OF LEAD IN AIR. American Chemical Society. Division of Water Waste Chemistry, Preprints 1962 (Sept.), pp. 34-6.

A survey and evaluation of analytical methods for the determination of Pb in air by the Analytical Reference Service with 42 participating laboratories is presented. The participants were given Pb-impregnated filter-paper tape made to simulate filters through which 1 m^3 air had been passed. Five different extraction methods were employed. For determination of the extracted Pb, 3 used the spectrograph, 27 the mixed-color dithizone procedure, 11 the monocolor dithizone procedure and 1 a green monocolor dithizone method. A pronounced effect of the method of extraction on the results was noted. Wet ashing with nitric acid yielded the greatest precision and accuracy regardless of the method of determination used. Results from samples pulped in dilute nitric acid showed less precision and accuracy and were generally on the high side. High ashing temperatures produced low results. In overall precision, the mixed-color dithizone methods were slightly better than the monocolor methods. Within the conditions established for this study, the results indicated that the nitric acid, wet ashing method for extraction, together with a mixed-color dithizone procedure is the method of choice for determining Pb on filter paper in the 0-10 µg range.

3925 Bobev, G. (Inst. Ind. Hyg. and Occupational Disease, Sofia, Bulgaria): Bǎrz metod za opredljane na neorganičnite sǎedinenija na olovoto vǎv vǎzduha na rabotnata sreda. (THE RAPID DETERMINATION OF INORGANIC LEAD COMPOUNDS IN THE WORKPLACE ATMOSPHERE.) Nauchni Trudove, na Nauchno-Izsledovatelski Institut po ohrana na truda i professionalni zaboljavanija, Profizdat, Sofia, Bulgaria, 9:176-81 (Dec.), 1962.

A rapid method for the quantitative determination of airborne Pb, based on the qualitative reaction of Pb with an aqueous solution of 0.2% Na rhodizonate, is described. The sensitivity of the method is increased by the addition of 0.25% H peroxide and Mn chloride. An instrument has been designed to facilitate the field use of the method. (From Occupational Safety and Health Abstracts 1:814, 1963)

3926 Bruusgaard, A. (Factory Inspectorate, Oslo, Norway): Vurderingen av blyverdier i urin. (EVALUATION OF LEAD LEVELS IN URINE.) Nordisk Hygienisk Tidskrift 43:50-2, 1962

In commenting on Lindberg's article (Abstr. No. 2298), the author states that when Pb values in the urine spot samples are evaluated it is most important, from a practical viewpoint, to take the specific gravity of the urines into consideration. Corrections of the values of the samples according to Levine and Fahy's formula give better accordance than do those proposed by Lindberg, when corrections are made for urines with specially high or low specific gravity. (From author's summary)

3927 Chamberlain, G.T. (East African Agr. Forestry Res. Organ., Kikuyu, Africa): SPECTROGRAPHIC DETERMINATION OF TRACE ELEMENTS USING A THREE-STEP FILTER AND THE RESPEKTRA CALCULATOR. Applied Spectroscopy 16:1-5, 1962.

The method was devised to reduce the amount of microphotometry involved in the variable internal-standard method and to increase the number of samples analyzed. The filter replaces the step sector and an emulsion calibration curve is prepared from the data by using a calculating board. Pb was among the 14 elements studied.

3928 Coeur, A., Bouvet, R., and Boucherie, A.: (PRACTICAL USE OF COMPLEXOMETRY IN THE ANALYSIS OF OFFICINAL DRUGS.) Lyon Pharm. 13:287-305, 1962.
The stability (log K) of cation complexes with EDTA for various elements are given, Pb^{++} being listed at 18.54. With the addition of suitable buffers if necessary to prevent precipitation, the following cations are determined: Mg, Ca, Mn, Zn, Pb, with Eriochrome Black indicator, at pH 10, 10, 8-11, 10, 10-11, respectively. (From Chemical Abstracts 58:4375, 1963)

3929 Collins, A.G., Pearson, C., Attaway, D.H., and Ebrey, T.G. (US Bur. Mines, Bartlesville, Okla.): METHODS OF ANALYZING OIL-FIELD WATERS. METALLICS: COPPER, NICKEL, LEAD, IRON, MANGANESE, ZINC, AND CADMIUM. US Bureau of Mines, Report of Investigations No. 6087, 1962, 24 pp.
An ion-exchange method (using Dowex A-1) was most practical for concentrating Cu, Ni, Pb, and Fe. Known amounts of the metals were added to a synthetic brine solution. After separation, spectrophotometric determination was made with: Cu Neocuproine, Ni dimethylglyoxime, Pb dithizone, Fe bipyridine, Mn as MnO, Zn Zincon, and Cd dithizone.

3930 Cottenie, A.H.: (QUANTOMETRIC METHOD FOR SOIL AND PLANT ANALYSIS.) Pedologie 12, No. 2:180-95, 1962.
A direct reading spectrograph was fitted with an analytical program for the determination of Mg, Al, Fe, Cu, Mn, Zn, B, Pb, Ni, Mo, and Co. The method makes use of synthetic standards. Soil samples are diluted 1:6 and plant ash 1:4, before loading on center post graphite electrodes. The diluent contains 1 part Li_2CO_3, 1 part $CaCO_3$, and 2 parts graphite. The emission source is an interrupted arc, the sample being the anode. For most soil and plant samples, the sensitivity was too low for a direct determination of Mo and Co. (From Chemical Abstracts 61:26, 1964)

3931 Elzinga, M.J.: Kwantitatieve bepaling van menie en bruinsteen in de lucht. (QUANTITATIVE DETERMINATION OF LEAD AND MANGANESE IN THE AIR.) Tijdschrift voor Sociale Geneeskunde 40:27-9 (Jan. 5), 1962.
Method is based on that by Amdur-Silverman, 1954.

3932 Frank, A. (Natl. Inst. Public Health, Stockholm, Sweden): A MODIFICATION OF THE McCORD AND ZEMP METHOD FOR DETERMINATION OF LEAD IN URINE. American Industrial Hygiene Association Journal 23:424-30 (Sept.-Oct.), 1962.
McCord and Zemp described a method for the determination of the total Pb in urine using "wet ashing" which shortened the ashing time to 30 min. The above method was modified in order to increase its stability and reproducibility. Identical results were obtained when this method was compared with one which involves complete ashing. The method can be used for the analysis of urine from persons suffering from Pb poisoning even after treatment with EDTA and penicillamine.

3933 Furman, N.H., ed.: STANDARD METHODS OF CHEMICAL ANALYSIS. VOL. 1. THE ELEMENTS. 6th ed. Princeton, N.J., Van Nostrand Co., Inc., 1962, pp. 556-84.
Gravimetric, titrimetric and colorimetric methods for the determination of Pb in biological material and in ores are reviewed.

3934 Gleit, C.E., and Holland, W.D. (Tracerlab Inc., Richmond, Cal.): RETENTION OF RADIOACTIVE TRACERS IN DRY ASHING OF BLOOD. International Journal of Applied Radiation Isotopes 13:307-3, 1962.
An alternate method to wet oxidation or dry ashing of organic materials is described. A flowing stream of O_2 at a rate of 4 cc/min is passed through a 3-in Vycor tube containing the sample. The tube is heated inductively using a 150 w, 27 mCi/sec oscillator. Sample temperature remains below 90° and the sample is decomposed into H_2O, CO_2, and CO by the highly reactive gaseous environment. Decomposition is complete in 1.5 hr, quantitatively retaining Sb, As, Cr, Co, Fe, Pb, Mn, Mo, and Zn in the boat. Preliminary experiments show that fat and muscle tissue and vegetable matter as well as small whole mammals can be treated without loss of most trace constituents.

3935 Golubev, S.N.: (THE SPECTRAL ANALYSIS OF TRACE ELEMENTS IN SOILS.) Mikroelementy i Estestv. Radioactivn. Pochv, Rostovsk. Gas. Univ., Materialy 3-go (Tret'ego) Mezhvuz. Soveshch. 1961:245-9 (Pub. 1962); Chemical Abstracts 58:12109, 1963.

3936 Gorn, L.E. (Inst. Ind. Hyg. Occup. Dis., Leningrad, USSR): (COLORIMETRIC DETERMINATION OF LEAD IN BIOLOGICAL LIQUIDS.) Vopr. Med. Khim. 8:625-7 (Nov.-Dec.), 1962.
The method for colorimetric determination of inorganic Pb in blood and urine is described. (From Chemical Abstracts 59:2092, 1963)

3937 Gude, A.: DETERMINATION OF INORGANIC RESIDUES IN HIGH POLYMERS AFTER SODIUM PEROXIDE DECOMPOSITION - PHOTOMETRIC LEAD DETERMINATION IN POLY(VINYL CHLORIDE) COMPOUNDS. Kunststoffe 52:472-3, 1962.
Pb can be determined with 50 mg samples and an accuracy of ±1.5%. (From Chemical Abstracts 57: 13951, 1962)

3938 Hallam, K.M. (Health Dept., Baltimore, Md.): INTERFERENCE IN DETERMINATION OF LEAD BY DITHIZONE EXTRACTION. Analytical Chemistry 34:1339 (Sept.), 1962.
A commercially prepared solution of 0.02% phenol red (Fisher 5-985 M) was found to interfere in the analysis of Pb in blood by the dithizone extraction method. Correspondence with the manufacturer revealed that a chelating agent is included in the preparation of this indicator solution and therefore it is not suitable for analysis of Pb by dithizone extraction.

3939 Hanamura, S. (Govt. Ind. Res. Inst. Nagoya, Japan): AN I-Q RECORDER AND ITS APPLICATION TO RAPID COULOMETRIC ANALYSIS AND MICRO-COULOMETRY. Talanta 9:901-15, 1962.

The author recently described a direct-reading current integrator and subsequently improved it into a recording instrument, the I-Q recorder. It can be used not only for coulometric analysis but also for other purposes. The highest sensitivity range is 10 μA; the reproducibility can be assumed to be 0.1%. Integration is possible from input zero to rated value. Rapid determination of micro amounts of Cd and Pb, 1-10 μg and 4-10 μg respectively, could be carried out. The rapid determination of 0.9 mg of Pb and 0.8 mg of Cd from their mixtures is discussed. (From author's summary)

3940 Hublet, P.: Problèmes rélatifs à la détermination des hématies à granulations basophiles dans le dépistage de l'intoxication saturnine. (BASOPHILIC STIPPLING OF ERYTHROCYTES IN THE DIAGNOSIS OF LEAD POISONING.) Arch. Belges Méd. Sociale, Hyg., Méd. Travail, Méd. Légale 20:167-74, 1962.

Tests for counting stippled blood cells were critically reviewed. The author favors the staining method by Manson-Schwartz. Stippled cells are divided into those with coarse granules, those with fine granules, and cells with a mixed form of granules. Data are given per mille or per million of erythrocytes. In evaluating the data, environment and clinical findings must be considered. (From Deutsche Zeitschrift für die Gesamte Gerichtliche Medizin 54:34 (Abstracts), 1963)

3941 Kawahata, M., Mochizuki, H., and Misaki, T. (Nippon Yakin Kogyo Co., Kawasaki, Japan): (SOLVENT EXTRACTION OF LEAD AND ZINC WITH DITHIZONE-BENZENE SOLUTION.) Bunseki Kagaku 11:448-9, 1962.

The absorbance curve for extraction of Pb by dithizone in C_6H_6 has a maximum at pH 8 and decreases smoothly to pH 12, pH range 7.5-11.5 being suitable. Dithizone remains in the C_6H_6 layer below pH 9.7, but is transferred to the aqueous layer above pH 10.2. (From Chemical Abstracts 57:1518, 1962)

3942 Klimov, I.T.: (THE CHEMICAL AND SPECTROGRAPHIC DETERMINATION OF TRACE ELEMENTS (HEAVY METALS) BY EXTRACTIVE CONCENTRATION.) Sovrem. Metody Analiza Prirodn. Vod., Akad. Nauk SSSR 1962:67-87.

The determination of microamounts of heavy metals in water, silt, and similar materials is based on extraction with $CHCl_3$ using group reagents, and on the spectrographic determination of 0.5-20 μg Ni, Co, Ag, Zr, Cu, V, Al, and Mn; of 2-80 μg Pb; 0.5-40 μg Mo and Ti; 2-40 μg Bi; 1-40 μg Fe; and <1 μg Sn; accuracy is ±10-20%. Amounts of any metals >1 mg must be diluted or removed. (From Chemical Abstracts 59:9321, 1963)

3943 Künzi, P., Bäumler, J., and Im Obersteg, J. (Inst. Forensic Med., Univ. Basel, Switzerland): Dünnschichtchromatographie der forensisch wichtigen Metalle. (THIN LAYER CHROMATOGRAPHY OF FORENSICALLY IMPORTANT METALS.) Deutsche Zeitschrift für die Gesamte Gerichtliche Medizin 52, No. 4:605-9, 1962.

In the method described for the detection, determination, and separation of Tl, Hg, Pb, As, Cd, Cu, Bi, and Sb a nitric acid benzene-acetone mixture was used for the flow system, and tartaric acid as complexing agent. Detection of cations depended on height of ascent and dye affinity with dithizone and ammonium sulfide solution. The method allows a qualitative analysis of heavy metal ions in 1 operation and enables a quantitative evaluation of the chromatogram by comparing sizes of spots with chromatograms of known metal contents. The method is applicable to the analysis of biological material; however, ashing is necessary; certain foods can be determined directly.

3944 Lakanen, E. (Agr. Res. Center, Helsinki, Finland): ANALYSIS OF SOLUBLE TRACE ELEMENTS. Ann. Agr. Fenniae 1, No. 2:109-17, 1962.

A (1:10) by volume extraction of soils was made with 0.5N acetic acid + 0.5N NH_4 acetate (pH 4.65). The trace elements, Ag, Bi, Cd, Co, Cu, Fe, Ge, Hg, In, Mn, Mo, Ni, Pb, Pd, Sn, Tl, V, and Zn are concentrated from the aqueous soil extract by 3% pyrrolidinedithiocarbamic acid (PDCA) in $CHCl_3$. The $CHCl_3$ layer is evaporated with Al_2O_3 and graphite and analyzed spectrographically. The effect of pH and other complexing agents on the use of PDCA was studied. (From Chemical Abstracts 59:8108, 1963)

3945 Liplavk, I.L.: (AMPEROMETRIC TITRATION IN AIR ANALYSIS.) Sb. Tr. Fiz.-Khim. Lab. Vses. Nauchn.-Issled. Inst. Okhrany Truda (Sverdlovsk: Gos. Izd. Lit. po Chern. i Tsvetn. Met.) 1962:5-24.

Procedures for amperometric titration determination of F, silica, Ni, Pb, Zn, and Mn are described. With a polarograph or simple electric measuring device an apparatus can be easily constructed for any type of amperometric titration. (From Ref. Zh. Khim. 1963, Abstr. No. 101271; Chemical Abstracts 60:4686, 1964)

3946 Lukin, A.M., Chernaya, L.S., Petrova, G.S., and Sosnina, A.I.: (EXTRACTION AND DETERMINATION OF LEAD BY ARSAZEN.) Savodsk. Lab. 28:398-401, 1962.

A method whereby 0.5 μg Pb can be determined in water and bronze with arsazen is explained. (From Chemical Abstracts 58:2838, 1963)

3947 Lupant-Andre, F. (Univ. Libre, Brussels, Belgium): Détection rapide de toxiques métalliques dans l'urine. (RAPID DETECTION OF TOXIC METALS IN URINE.) Journal de Pharmacie de Belgique 17, No. 1-2, 14-30, 1962.

A sample of 50 ml urine is heated with 2 mg concentrated sulfuric acid and 300 mg K permanganate for 2 hr until all organic matter is destroyed. Pb is then extracted with dithizone at a pH 3 and estimated colorimetrically as Pb dithizonate.

3948 Lyaskovskaya, Yu.N. and Krasil'nikova, T.F.: (PHOTOMETRIC METHODS OF DETERMINATION OF TIN AND LEAD IN CANNED MEATS.) Tr., Vses. Nauchn.-Issled. Inst. Myasn. Prom. 1962, No. 12:128-48.

A spectrophotometric method, on the basis of a reaction with quercetin, for the determination of Sn and Pb in canned meats was developed. The method gives reproducible results; sensitivity is 5 μg Pb in 50 ml solution and error averages ±11.5%. (From Ref. Zh., Khim. 1963, Abstr. No. 15P132; Chemical Abstracts 60:13794, 1964)

3949 Malyuga, D.P., and Makarova, A.I. (V.I. Vernadskii Inst. Geochem. Anal. Chem., Acad. Sci. USSR, Moscow): (POLAROGRAPHIC DETERMINATION OF LEAD IN SOILS AND VEGETATION OVER ORE DEPOSITS.) Teoriya i Praktika Polyarograf. Analiza, Akad. Nauk Moldavsk. SSR, Materialy Pervogo Vses. Soveshch 1962:272-6.
In the polarographic method described, for 10-100 μg Pb/10 ml the diffusion current was proportional to concentration. The half-wave potential of Pb was 0.45 v, and the sensitivity was 1 μg/ml. (From Chemical Abstracts 59:12155, 1963)

3950 Manley, C.H. (Bristol, England): DETERMINATION OF TRACES OF LEAD IN DRINKING WATER. Analyst 87:762 (Sept.), 1962.
The author refers to an article by D.C. Abbott and J.R. Harris: "The Determination of Traces of Lead in Drinking Water (1962)" in which it was stated that "the sulfide method is not applicable to water containing organic matter and Fe". In a paper published by the author under the title "The Estimation of Lead in Drinking Water (1940)" it was shown that it is possible to apply the sulfide method with precision to peaty waters naturally colored by organic matter.

3951 Markova, A.L. (Inst. Hydrogeol. Eng. Geol. Moscow, USSR): (SULFARSAZENE FOR THE PHOTOMETRIC DETERMINATION OF LEAD IN FRESH AND MINERALIZED WATERS.) Zh. Analit. Khim. 17:952-4, 1962.
Sulfarsazen was used for the determination of ±1-1.5 μg Pb/l in fresh and mineralized waters after preliminary extraction with dithizone in CCl_4. (From Chemical Abstracts 58:11097, 1963)

3952 Musil, F. (Karlova Univ., Prague, Czechoslovakia): (OSCILLOGRAPHIC POLAROGRAPHY AND ITS UTILIZATION IN MEDICINE.) Pracovni Lekar. 14:426-9, 1962.
Principles of the method are given with examples featuring the estimation of Au, Pb, Sn, As, Cr, Mn, Co, and Ni in the blood and other substances. (From Chemical Abstracts 58:3682, 1963)

3953 Nikiforova, V.N., and Teplova, E.V.: (APPLICATION OF A POLAROGRAPHIC METHOD FOR DETERMINING COPPER, LEAD, AND ZINC IN CONFECTIONARY PRODUCTS.) Khlebopekar. i Konditer. Prom. 6, No. 9:6-8, 1962.
A polarographic method is outlined for determining Cu, Pb, and Zn in confectionary products. Data are given to show acceptability of the method for a variety of products. (From Chemical Abstracts 58:1860, 1963)

3954 Priev, Ya.M.: (SPECTROSCOPIC ANALYSIS OF PLANT MATERIAL WITHOUT PRELIMINARY ASHING.) Sb. Rabot. Molodykh Uchenykh Nauchn. Issled. Inst. i Vyssh. Uchebn. Zavedenii Min. Sel'sk. Khoz. Uz. SSR 1962, No. 1: 128-30.
A method is suggested for the spectroscopic analysis of plant matter which does not require preliminary ashing of the sample. A ground, air-dried, weighed sample of the plant material is tamped into a cigaret casing and placed in the horizontal arc between C electrodes of an ABP-2 apparatus. Stabilization of the arc and the introduction of the casing from above insures an air current (20-30 mm H_2O column) controlled by a water manometer. Sample weights of 0.2-1 g are taken for quantitative and semiquantitative analysis. The current is fed by 16-18 amp ac. The distance between the electrodes is 5-6 mm. The rate for introducing the casing should not exceed 60 sec for a 0.2 g sample and 145 sec for a 0.4 g sample. Twenty-three elements can be analyzed in this way (B, Mn, Ca, Cr, Zn, Si, Sr, Mg, K, Mo, Al, Fe, Ag, Li, Sn, Pb, V, Na, Bi, P, Ti, Ba, Ni) with an error of ±20-40%. The work was done on a Q-12 quartz spectrograph. (From Ref. Zh., Khim. 1963, Abstr. No. 12G193; Chemical Abstracts 60: 8332, 1964)

3955 Prokes, J., Vorel, F., and Dolezal, V. (Kolova Univ., Prague, Czechoslovakia): (APPLICATIONS OF OSCILLOGRAPHIC POLAROGRAPHY IN TOXICOLOGY.) Chem. Zvesti 16: 411-3, 1962.
Oscillographic polarographic methods for the determination of local anesthetics, ataractics, and barbiturates are described. Pb, Tl, and Zn can be determined after the electrolytic accumulation of the metal on the electrode. (From Chemical Abstracts 58:7285, 1963)

3956 Protopopova, V.P.: (QUANTITATIVE DETERMINATION OF MANGANESE, LEAD AND MERCURY IN BIOLOGICAL MATERIAL.) Novoe v Oblasti Sanit.-Khim. Analiza (Raboty po Prom.-Sanit.-Khim.) 1962:248-53.
Pb is determined colorimetrically in blood or urine digested with nitrosylsulfuric acid, after adding NH_4 citrate and $NH_2OH.HCl$ and extracting with dithizone in CH_3Cl. Normal levels in blood were 0.01-0.025 mg% and in urine, 0.003-0.03 mg%. (From Chemical Abstracts 59:2090, 1963)

3957 Razumov, V.A., and Aidarov, T.K.: (SPECTROGRAPHIC METHODS OF DETERMINING MICROQUANTITIES OF LEAD IN THE AIR OF INDUSTRIAL PREMISES AND IN BIOLOGICAL SAMPLES. Gigiena i Sanit. 27, No. 8:44-7, 1962.
Pb is determined in samples of air by emission spectroscopy using the 2833.07 A Pb and the 2897.97 A Bi lines. Pb is determined in the urine by an analogous method. (From Chemical Abstracts 58:1848, 1963)

3958 Sagakova, V.P., and Lyubivaya, A.I.: (RAPID DETERMINATION OF LEAD IN CANNED GOODS.) Tr. Ukr. Nauchn.-Issled. Inst. Konservn. Prom. 1962, No. 4:62-7.
Pb is determined with dithizone without the use of cyanides. The sensitivity of the method is 0.05 μg/10 ml solution and only 1.5 hr is required after mineralization. Pb was reported in various canned

goods and unprocessed material. (From Chemical Abstracts 59:12079, 1963)

3959 Sikorska-Tomicka, H. (Akad. Med. Bialystok, Poland): (CHROMATOGRAPHIC SEPARATION OF BISMUTH, LEAD AND MERCURY IONS.) Roczniki Akad. Med. Bialymstoku 7:267-72, 1962.

Pb^{++} was separated by ascending chromatography on Whatman No. 1 paper impregnated with 1% KI, 2% caprolactam and 1% Na hypophosphate. The sensitivity of Pb was 1.0 µg. (From Chemical Abstracts 58:9609, 1963)

3960 Sinyakova, S.I., and Shen, Y.C.: (POLAROGRAPHIC DETERMINATION OF VERY SMALL AMOUNTS OF METALS WITH A STATIONARY MERCURY ELECTRODE.) Teoriya i Praktika Polyarogr. Analiza, Kishinev, Sb. 1962:151-8.

The effect of various factors on the quantitative determination of certain elements in concentrations of 10^{-7}-10^{-8}M by using a stationary Hg drop electrode was studied. Diagrams are given. Pb, In, and Cd can be determined from the same solution. The accuracy is ±6% for $\geq 10^{-8}$M Pb, in the presence of a 10-fold amount of Cu, Cd, and Zn. (From Chemical Abstracts 58:13117, 1963)

3961 Specker, H., and Trub, H. (Inst. Spektrochem., Dortmund, Germany): (DETERMINATION OF TRACES OF LEAD IN CONCENTRATED PHOSPHORIC ACID BY ANODIC AMALGAM VOLTAMETRY.) Zeitschrift für Analytische Chemie 186: 123-7, 1962.

Pb is determined in concentrated H_3PO_4 by deposition in a Hg drop from pyridine solution, followed by measurement via anodic voltametry. At 1 ppm Pb the deviation is 3%.

3962 Stepanyuk, N.V., Bulycheva, A.I., and Mel'nikova, P.A.: (TURBIDIMETRIC DETERMINATION OF LEAD IN AIR.) Sbornik Nauchnykh Rabot Institutov Okhrany Truda Vsesoyuznogo Tsentral'nogo Soveta Profsoyuzov 1962, No. 3:97-103.

Pb reacts with Na rhodizonate in an acid medium to form Pb rhodizonate which is determined turbidimetrically with a sensitivity of 2 µg Pb/3 ml of sample. Oxides of Fe, Cu, Sn, Al, Zn, Mg and Sb do not interfere when masking reagents are used. (From Chemical Abstracts 60:11368, 1964)

3963 Stromberg, A.G., Zakharov, M.S., and Gorodovykh, V.E.: (POLAROGRAPHIC DETERMINATION OF ULTRAMICROQUANTITIES OF LEAD.) Teoriya i Praktika Polyarogr. Analiza, Kishinev, Sb. 1962:336-40.

Concentrations of $\leq 10^{-8}$M can be determined by oscillographic and amalgam polarography. Results have good reproducibility if experimental conditions are held constant. (From Chemical Abstracts 59:9311, 1963)

3964 Van Erkelens, P.C. (Inst. Animal Husbandry, Utrecht, Netherlands): RADIOMETRIC TRACE ANALYSIS OF LEAD WITH DIETHYLDITHIOCARBAMATE AND Tl^{204}. Analytica Chimica Acta 26:32-45, 1962.

Two methods are given for determining <µg amounts Pb: (A) determining 0.1-0.5 µg Pb, especially in the presence of Bi and/or Tl and Fe, Cu, Hg, Zn, Ag, PO_4 and P_2O_7; (B) determining 0.1-0.6 µg Pb with Bi and Tl, Fe, Cu, Hg, and Ag, other heavy cations, P_2O_7 and PO_4. Method B is preferred for sensitivity and speed. The error in the recoveries of 0.05-0.6 µg Pb is 1-7%, av 4%.

3965 Varma, A. (Hindu Univ. Barnaras, India): DETERMINATION OF ALUMINUM, CERIUM(III), AND LEAD WITH FLUORIDE BY AN AMPEROMETRIC INDICATOR METHOD. Bull. Chem. Soc. Japan 35:1444-6, 1962.

Al, Ce(III), and Pb at concentrations as low as 10^{-4}M are determined by using 0.04 v across 2 Pt electrodes, with a $FeCl_3$ indicator. (From Chemical Abstracts 57:14420, 1962)

3966 Willis, J.B. (Chemical Res. Lab., Melbourne, Australia): DETERMINATION OF LEAD AND OTHER HEAVY METALS IN URINE BY ATOMIC ABSORPTION SPECTROSCOPY. Analytical Chemistry 34:614-7, (May), 1962.

A method for the determination of <1 mg/l Pb in urine by atomic absorption spectroscopy is described. The existing methods for the determination of Pb in urine are reviewed and compared.

3967 Yamashita, S.: X-RAY SPECTROCHEMICAL ANALYSIS OF LEAD CONTENTS IN CRAYONS. Tokyo Metropol. Isotope Center, Annual Report 1:45-52, 1962.

The Pb content (found to be high) in crayons, pastel crayons and water colors made in Japan was determined by X-ray methods. (From Chemical Abstracts 62:4215, 1965)

3968 Zakharov, M.S., and Stromberg, A.G.: (THE REPRODUCIBILITY OF (POLAROGRAPHIC) DETERMINATIONS AT A STATIONARY MERCURY DROP IN THE DETERMINATION OF ULTRAMICRO AMOUNTS OF IMPURITIES.) Zavodsk. Lab. 28, No. 1:13-15, 1962.

Reproducible polarograms of microamounts (10^{-7}M) of Pb were obtained with a single Hg drop suspended on a Pt wire. (From Chemical Abstracts 56: 14898, 1962)

3969 Zeeman, P.B., and Butler, L.R.P. (Univ. Stellenbosch, South Africa): THE DETERMINATION OF LEAD, COPPER, AND ZINC IN WINES BY ATOMIC ABSORPTION SPECTROSCOPY. Applied Spectroscopy 16:120-4, 1962.

A Pb lamp with demountable cathode and a burner with absorbing path of 8 in are described. The coefficient of variance for Pb was 3.7%. In a comparison of Pb analysis by the above technique and by chemical analysis, concentrations of 0.17-0.9 and 0.05-1.48 ppm were found in 23 samples of wines.

1963

3970 American Conference of Governmental Industrial Hygienists, Committee on Recommended Analytical Methods: DETERMINATION OF LEAD IN AIR AND IN BIOLOGICAL MATERIALS. THE "USPHS" DOUBLE EXTRACTION, MIXED COLOR DITHIZONE METHOD. In Manual of Analytical Methods Recommended for Sampling and

Analysis of Atmospheric Contaminants. Cincinnati, Ohio, 1958-, LEAD (USPHS)-1-18; Approved in 1963.

As stated in the introduction, the title method is especially convenient for Pb analysis in the absence of Bi. The method was designed for highly accurate analysis of minute amounts of Pb in biological materials; thus, all details of the procedures for the collection and ashing of samples, for the purification of reagents, and for the preparation of glassware and other supplies must be followed carefully and routinely for best results. The method has been used for 25 yr for the analysis of body tissues and fluids, air samples, paints and diverse materials. A rapid procedure for the removal and analysis of a known area of paint film from a sheet metal surface is also presented.

In addition to detailed description of the above procedures, interferences in analysis are detailed, and the results of replicate analyses by referee's laboratory of Pb in blood and of those by 10 collaborating laboratories are tabulated.

3971 Black, L.R., Lancaster, E.B., and Maister, H.G. (Northern Regional Res. Lab., Peoria, Ill): DETERMINATION OF CHROMIUM AND LEAD IN PERIODIC ACIDIC SOLUTION AND DIALDEHYDE STARCH. Cereal Chemistry 40:66-71, 1963.

After ashing according to the described method, Pb is determined by treating an aliquot with diphenylthiocarbazone in $CHCl_3$ and reading the red color at 518 mμ. The slope of the standard curve was 3.57 ppm/absorbance unit with SD from regression of 0.048. Recovery was slightly low. (From Chemical Abstracts 59:5354, 1963)

3972 Bonelli, E.J., and Hartmann, H.: DETERMINATION OF LEAD ALKYLS BY GAS CHROMATOGRAPHY WITH ELECTRON CAPTURE DETECTOR. Analytical Chemistry 35:1980-1 (Nov.), 1963.

The article describes the use of the Barrell-Ballinger type column operated isothermally and with a Hg nitrate scrubber column. The 5 PB alkyls were completely separated in 10 min with good quantitative recovery. The overall accuracy of the method is ∿4%.

3973 Colony, J.A., Knoblock, E.C., and Purdy, W.C. (Walter Reed Army Inst. Res., Washington, D.C.): COMPARATIVE STUDY OF THE DITHIZONE AND POLAROGRAPHIC DETERMINATIONS FOR LEAD. Tech. Bull. Registry Med. Technologists 33, No. 5:82-5, 1963.

Results obtained by the dithizone and polarographic methods for the determination of Pb in blood and urine were compared and possible interfering ions that may cause abnormally high values by the dithizone method were studied. (From Chemical Abstracts 59:5760, 1963)

3974 Echegaray, M. (Inst. of Occup. Health, Lima, Peru): Determinación de plomo y bismuto en muestras biológicas. (DETERMINATION OF LEAD AND BISMUTH IN BIOLOGICAL MATTER.) Boletin de la Sociedad Quimica del Peru 29, No. 3:126-44, 1963.

Bi and Pb in blood or urine were extracted with a solution of dithizone in chloroform, in the presence of K cyanide, ammonium citrate and hydroxylamine chlorhydrate, at pH 8.5. After stirring the mixture for 1 hr with a buffer solution at pH 3.4, Pb was determined colorimetrically at 520 mμ.

3975 Feldstein, M. (Bay Area Air Pollut. Control Distr., San Francisco, Calif.): ANALYTICAL METHODS FOR AIR POLLUTANTS. Progress in Chemical Toxicology 1:317-38, 1963.

Three categories of pollutants are considered in this review: (1) Pollutants having a direct toxic effect if present in the atmosphere in sufficient concentration for a sufficient period of time; (2) pollutants not present in the atmosphere in sufficient concentration to cause toxicity but creating nuisance due to odor; (3) pollutants involved in the photochemical process occurring in the ambient atmosphere, leading to the formation of eye-irritating, vegetation-damaging, and visibility-reducing reaction products. Pb belongs to the 1st group listed; its concentration in nonpolluted and polluted air, respectively, is given as 0-10 and 30-40 $\mu g/m^3$. The collection of air samples for the determination of Pb is described. In view of the relatively small quantities of Pb in the normal atmosphere extreme caution in collection and analysis is mandatory to prevent contamination of samples. A detailed description of the reagents for and the procedure of Pb determination, using the dithizone method, is included.

3976 Fujinaga, T., Brodowsky, H.A., Nagai, T., and Yamashita, K. (Univ. Kyoto, Japan): USE OF A TERNARY MIXTURE AS A SOLVENT IN POLAROGRAPHIC ANALYSIS. Review of Polarography (Kyoto)11, No. 3-4:217-23, 1963.

Traces of Pb were determined by adding Na diethyldithiocarbamate to the sample solution and extracting the chelate formed with chloroform. A mixture containg 5 ml chloroform, 1.7 ml concentrated HCl, 2 ml water and the necessary amount of Me Cellosolve to dilute to 20 ml was used as the medium for the subsequent polarographic determination of Pb. (From Chemical Abstracts 63:1204, 1965)

3977 Hawkes, H.E.: DITHIZONE FIELD TESTS (FOR COPPER, LEAD AND ZINC). Economic Geology 58:587-92, 1963.

A method for the analysis of soils and stream sediments for Pb, Cu, and Zn, by treating the material simultaneously with a cold, slightly alkaline, aqueous solution of ammonium citrate and a solution of dithizone in toluene, hexane or light petroleum, was described. A standard Zn solution is used for calibration and the metals are reported as "Zn equivalents." (From Water Pollution Abstracts 39:Abstr. No. 1069, 1966)

3978 Hilf, R., and Castano, F.F. (US Army Area Med. Lab., Fort Baker, Calif.): A SIMPLIFIED METHOD FOR DETERMINATION OF URINARY LEAD. Clinical Chemistry 9:163-7 (Apr.), 1963.

A modification of the quantitative determination of urinary Pb by reaction with dithizone is described. The method takes less time than the original procedure with no loss in accuracy. Good recoveries were obtained in the range of 60-150 μg/l. The authors note that it has been the practice of their laboratory to report the exact concentration of any sample showing $\geq$50 μg/l (because of the discrepancy in the literature as to the normal urinary Pb content) and to suggest analysis of additional samples for confirmation.

3979 Hollos, J. (Chinoin Pharm. Chem. Co., Budapest, Hungary): (DETERMINATION OF Fe, Cu, Zn, AND Pb AS DRUG IMPURITIES IN THEIR MUTUAL PRESENCE. II. SUBSEQUENT ISOLATION AND DETERMINATION OF Cu, Zn AND Pb WITH DITHIZONE.) Gyogyszereszet 7, No. 5-6:204-10, 1963.

The substance to be analyzed (1 g) is decomposed by heating in the presence of 10 ml concentrated sulfuric acid and adequate amounts of H peroxide and perchloric acid. After decomposition, the volatile products are removed and the residue is taken up in aqueous acetic acid. Pb ion is isolated from weakly alkaline solution (pH 8.5); the extracted Pb dithizonate is decomposed at pH 4.6 and the liberated Pb ion is determined in a weakly alkaline medium containing cyanide ion with chloroformic dithizone solutions. (From Chemical Abstracts 60:1540, 1964)

3980 Ito, Y. (Univ. Miyazaki, Japan): (METHOD OF DETERMINATION OF DUST POWDERS. II. SIMPLE DETERMINATION OF PARTICLES BY DEVELOPMENT ON PAPER - DETERMINATION OF $Pb(NO_3)_2$ PARTICLES.) Kogyo Kagaku Zasshi 66:194-8, 1963.

Known amounts (0.01-1 μM) of Pb in solution were placed on filter paper and developed with various solutions. The paper was then dried at 90° and sprayed with a 0.2% Na rhodizonate solution. A proportional relation was found between the area of the spot and the amount of Pb. From the color development and its area, the amount and size of Pb nitrate ($Pb(NO_3)_2$) dust particles in the air can be determined. (From Chemical Abstracts 59: 14494, 1963)

3981 Jaworowski, Z. (Inst. Nuclear Res., Warsaw-Świerk, Poland): THE DETERMINATION OF LEAD-210 AND BISMUTH-210 IN BIOLOGICAL MATERIAL. Nukleonika 8, No. 5:333-40, 1963.

A method for the simultaneous determination of stable Pb and ^{210}Pb in hair and bone samples is described. Hair samples are wet-washed with concentrated nitric and perchloric acid and dissolved in H chloride. After extraction with dithizone the total Pb content is estimated photometrically and ^{210}Pb activity by a scintillation counter. Bone samples are ashed before extraction with dithizone. Mean recoveries of stable Pb from hair and of ^{210}Pb from bone were 96.4 and 93.3%, respectively.

3982 Kamiński, B., and Dytkowska, O. (Galenical Drugs Inst., Warsaw, Poland): DETERMINATION OF HEAVY METALS IN VEGETABLE DRUGS. Acta Poloniae Pharmaceutica (Translated Reprint) 20, No. 3:210-6, 1963.

In the course of control analyses of drugs of plant origin carried out in the Department of Galenical Drugs in 1957, excessive contamination by heavy metals was found repeatedly. In 1956 the Ministry of Health revised the limits earlier specified by the Pharmacopoeia Polonica III, setting them (as determined as Pb) at 5 mg/kg for tinctures, 25 for liquid and 100 for dry extracts, and 10 for syrups.

A method of determining Zn, Sn, Cu, Pb, and Fe by paper electrophoresis is described in detail. The limits of detection were within the range of 0.1-0.5 μg, using small samples. For illustration the percentages of the above metals found in various samples obtained from drug stores are shown. The Pb content ranged from 0.005-0.01%.

3983 Keenan, R.G., Byers, D.H., Saltzman, B.E., and Hyslop, F.L. (US Public Health Service, Cincinnati, O.): THE "USPHS" METHOD FOR DETERMINING LEAD IN AIR AND IN BIOLOGICAL MATERIALS. American Industrial Hygiene Association Journal 24:481-91 (Sept.-Oct.), 1963.

The "USPHS" method for determination of Pb in air and biological samples is described. An evaluation of the method for Pb in blood shows a mean recovery of 97.1% Pb. Also included is a rapid procedure for the removal of a known area of paint film from a sheet metal surface and the determination of its Pb content in terms of percentage or of mg Pb/in^2.

3984 Kyuregyan, E.A.: (DETERMINATION OF SMALL AMOUNT OF LEAD IN NATURAL WATERS AND IN SOIL WATER. EXTRACTION WITH NEW REAGENT PLUMBON.) Izvestiya Akademii Nauk Armyanskoi SSS, Seriya Geologicheskie i Geograficheskie Nauki 16:4-5, 163-6, 1963.

Plumbon, a new reagent for colorimetric determination of Pb, forms an orange compound with Pb at pH 9. Plumbon can be used for the determination of Pb in natural waters and in ground water if present in amounts >0.01 mg. The presence of Zn, Cu, Fe or Mo in the soil interferes in the determination. (From Chemical Abstracts 60:3870, 1964)

3985 Le Riche, H.H., and Weir, A.H. (Rothamsted Expt. Sta., Harpenden, Hertfordshire, England): A METHOD OF STUDYING TRACE ELEMENTS IN SOIL FRACTIONS. Journal of Soil Science 14, No. 2:225-35, 1963.

A method is described for dividing soils into Fe oxide, sand, silt, and clay fractions suitable for trace-element analysis. The oxides were extracted under ultra-violet light by ammonium oxalate (pH 3.3), which dissolves goethite and other Fe oxides but not gibbsite or boehmite; it also extracts some soil organic matter and, probably, trace elements associated with it. Two horizons of 2 brown earths were analyzed spectrochemically for Ba, Co, Cr, Cu, Ga, Mn, Ni, Pb, Sr, Ti, V, and Zr. The extracted oxides were the fractions richest in trace elements and contained large proportions of the total Co, Cu, Mn, Pb, and V. Except for Sr, Ti, and Zr, the amounts of trace elements in the sands were small and were distributed between the silicate-mineral fractions in the order: sand < silt < clay. Pb results (ranges) in ppm and μg/g of soil, respectively, were: soil, 24-71 and

20-71; extract, 230-360 and 13-31; sand, <6-12 and <2.4-6.6; silt, 10-54 and 1.9-14; clay, 23-100 and 5.0-10. (23 references)

3986 Lifschitz-Menuchin, L., Eger, E. and Steinitz, K. (Beilinson Hosp., Petah Tikva, Israel): A RAPID METHOD FOR THE MICRO-ESTIMATION OF LEAD IN URINE. Bulletin of the Research Council of Israel 10E: 206-7 (Apr.), 1963.

A technique for determining Pb in 20 ml urine by direct titration with dithizone, omitting the washing with cyanide, is described.

3987 Lu, M.L., Liu, T.C., and Ching, T.L. (First Med. College, Shanghai, China): (DETERMINATION OF Ca, Ba, Mg, Al, Cr, Zn, Fe, Pb, Bi, Hg, and Cu IONS BY EDTA TITRATION USING THE CU-PAN SYSTEM.) Acta Pharmaceutica Sinica 10:436-41 (July), 1963.

The application of Cu-Pan system EDTA titration of some cations was reinvestigated systematically. The influence of various factors such as pH, temperature, quantity of indicator used, was studied in some detail and stability constants of Cu-Pan complex were given. An improved method of application is described. (From authors' English summary).

3988 Matveeva, L.A.: (HYDROLYTIC PRECIPITATION OF HEAVY METALS.) Gidrogeokhim. Materialy, Akad. Nauk SSSR, Lab. Gidrogeol. Probl. 1963:99-107.

After pretreatment, heavy metals were determined colorimetrically (Cu by diethyldithiocarbamate, Zn by dithizone, Pb as sulfide, and Mn as MnO_4) or titrated with EDTA (Pb and Zn). The curves in which is presented the content of these metals in natural waters of different pH values show that precipitation occurs at pH 5.4-7.5 for $CuSO_4$, 6.0-8.0 for $Pb(NO_3)_2$, 7.9-8.5 for $ZnSO_4$, and 7.7-8.5 (with 0.1N NaOH) or 8.4-9.0 (0.1N Na_2CO_3) for $MnSO_4$. The residual concentrations are: Cu 0.2-0.7, Pb 0.3-1, Zn 1-2, and Mn 0.5-1 mg/l. They are increased slightly at higher pH. The precipitation of Zn and partly of Mn in natural waters starts at lower pH values than in pure solutions. (From Chemical Abstracts 60:2642, 1964)

3989 Mehani, S. (Univ. Durham, Newcastle upon Tyne, England): A RAPID METHOD FOR THE DETERMINATION OF DELTA AMINO-LAEVULINIC ACID IN URINE. British Journal of Industrial Medicine 21:78-80 (Jan.), 1963.

A rapid colorimetric method, sensitive to 0.5 µg, for the determination of ALA in urine, is described. The method is a modification of the picrate method of Shuster in which interference by porphobilinogen is avoided by the use of an exchange resin. The overall method takes about 1/3 the time required by that of Mauzerall and Granick (1956), with no loss of precision.

3990 Monkman, J.L. (Environ. Health Center, Ottawa, Canada): DETERMINATION OF HEAVY METALS IN URINE BY POLAROGRAPHY. I. LEAD. Analytical Biochemistry 6:255-62 (Sept.), 1963.

Freshly voided urine (25-75 ml) is reacted with about 1 ml aqueous ammonia to raise its pH to at least 10, centrifuged for 15 min and the resulting cake dissolved in nitric acid. The acid solution is then evaporated to dryness, ashed, and treated with nitric and hydrochloric acids; the solution is placed into a polarograph cell, to which Hg was 1st added, then treated with O-free N. The polarogram is recorded at 25°C and the amount of Pb present is determined by comparison with a calibration curve. The method is claimed to be simple and rapid, with excellent reproducibility. Recovery of Pb added to urine varied from 90-110%.

3991 Müller, K.: Über eine analytische Trennung von Blei und Mangan aus biologischem Material. (AN ANALYTICAL SEPARATION OF LEAD AND MANGANESE IN BIOLOGICAL MATERIAL.) 2. Arbeitstag. Gerichtsärzte DDR. Leipzig 1963.

The difficulty of an accurate determination of Pb and Mn in body fluids and organs is pointed out, mainly because these trace elements occur normally only in the range of µg/100 g, while the interfering substances are present in relatively high concentrations. A new electrolytic separation is described in which Pb and Mn are precipitated as difficultly soluble dioxides and separated from all other elements by microfiltration. After dissolving the dioxides, Pb and Mn are determined by the usual methods. The procedure offers the advantage of obtaining small final volumes from larger samples. (From Deutsche Zeitschrift für die Gesamte Gerichtliche Medizin 55:32, 1964)

3992 Natelson, S., and De, P.K. (Roosevelt Hosp., New York, N.Y.): APPLICATION OF X-RAY EMISSION SPECTROMETRY TO THE ESTIMATION OF THE HEAVY ELEMENTS (AT. NO. 79-83). PRACTICAL PROCEDURE FOR LEAD AND BISMUTH IN WHOLE BLOOD. Microchemical Journal 7:448-61 (Dec.), 1963.

A study with the X-ray spectrometer for the estimation of µg quantities of Au, Hg, Th, Pb, and Bi is reported. Conditions and apparatus for plating the element sought in a confined spot on a metal plate are described. For Pb, results suitable for semiquantitative purposes were obtained. When whole blood was ashed, recovery of Pb ranged from (mean) 95.6-104.6%, with a precision of ±7%. In pooled specimens, mean Pb values of 8.8 µg/100 ml were found in the whole blood of individuals not exposed to abnormal amounts of this element.

3993 Obraztsova, E.N., and Novikov, V.A.: DETERMINATION OF TETRAETHYLLEAD. U.S.S.R. patent 154,431, July 24, 1963.

TEL is broken down by ultraviolet light in an automatic process. The Pb which forms is collected on paper tape, treated with an indicator and measured with a photometer. (From Chemical Abstracts 60:1124, 1964)

3994 Pahler, C., and Bye, J. (Coll. Sciences, Strasbourg, France): Voltampérométrie du bismuth, du plomb et du cuivre à la microélectrode d'or. (VOLTAMMETRY OF BISMUTH, LEAD, AND COPPER AT A GOLD MICROELECTRODE.) Comptes Rendus Hebdomadaires des Séances de l'Academie des Sciences 257, No. 2: 441-3, 1963.

In the 0.1M perchloric medium the waves of Bi^{3+}, Pb^{2+} and Cu^{2+} ion reduction generally interfere with the wave of proton reduction. In contrast the peak of the anodic oxidation of the deposit formed on the electrode permits the determination of traces of these ions and can serve as an end point indicator in quantitative analysis by various oscillographic methods, eg, the coulometric, which gives results similar to the dithizone spectrophotometric method.

3995 Polezhaev, N.G.: (NEW (NEPHELOMETRIC) DETERMINATION OF SMALL AMOUNTS OF LEAD.) Gigiena Truda i Prof. Zabolevaniya 7, No. 3:56-8, 1963.

A method for the determination of 0.05-0.5 µg Pb in 2 ml solution is described. (From Chemical Abstracts 59:4536, 1963)

3996 Riebartsch, K. (Biol. Bundesanstalt, Berlin-Dahlem, Germany): (DETERMINATION OF LEAD IN PLANT SUBSTANCES BY MEANS OF DITHIZONE.) Landwirtschaftliche Forschung 16:290-5, 1963.

The determination of Pb in plant substances, using the dithizone method, yielded too low Pb values. The method could be improved by modifying the process of ashing of substance and by reducing the pH value in the K cyanide washing solution. Furthermore, dry ashing should be replaced by decomposition with sulfuric-nitric-perchloric acid. (From Chemical Abstracts 60:13551, 1964)

3997 Sand, T.: Die Bestimmung von Blei in der Luft. (DETERMINATION OF LEAD IN AIR.) Zentralblatt für Arbeitsmedizin und Arbeitsschutz 13:157-62 (July), 1963.

A modified method for the rapid determination of Pb in air is described. The method permits the determination of amounts as low as 0.05 mg Pb/m^3. Atmospheric Pb concentrations at various work places in a battery factory are tabulated. The Pb level could be reduced by the installation of suitable exhausts.

3998 Saunier, R.: (INORGANIC CONSTITUENTS OF SUGARS AND SUGAR PRODUCTS.) Sucr. Franc. 104:1-4, 1963.

Methods of determining inorganic impurities are discussed, with recommendations as follows: for Pb, the method of "wet ashing" with addition of Na hexametaphosphate and hydroxylamine-HCl; for Fe, the o-phenanthroline method; for Cl, in colored products, the $AgNO_3$ method with potentiometric titration; for SO_2, the method used by the laboratory of the Syndicat National des Fabricants du Sucre de France; and for alkali and alkaline earth metals, flame photometry. (From Sugar Industry Abstracts 25:Abstr. No. 277, 1963)

3999 Snyder, L.J., and Henderson, S.R.: DETERMINATION OF LEAD IN GASES. U.S. Patent No. 3,071,446, Jan. 1, 1963, to Ethyl Corp.

Pb, particularly tetraalkyllead, in gases is determined by an improvement in the Snyder dithizone method. (From Chemical Abstracts 58:6200, 1963)

4000 Sobczynski, Z., Kolankowski, S., Kaminska, U., and Kaczor, K. (Dept. of Exptl. Physics, School of Higher Education, Gdansk, Poland): (INVESTIGATION OF THE ABSOLUTE ACTIVITY MEASUREMENT OF WEAKLY RADIOACTIVE PREPARATIONS USING A DIFFUSION CHAMBER.) Zeszyty Naukowe Wyzszej Szkoly Pedagogicznej Gdansku, Materialy, Fiziki, Chemii, 3:33-4, 1963.

A simple diffusion chamber was developed for absolute activity measurements on ^{210}Pb. A value of 0.46 x 10^{-6} µCi was obtained with this diffusion chamber, compared with a value of 0.48 x 10^{-3} µCi when a scintillation counter was used. (From Nuclear Science Abstracts 20: Abstr. No. 14896, 1966)

4001 Steiner, R.L., and Oliver, R.T. (Aluminum Co. Am., New Kensington, Pa.): SPECTROCHEMICAL DETERMINATION OF TRACE METALS IN BEER. American Society of Brewing Chemists 1963:111-13 .

The spectrochemical method presented consists of evaporating a 25-ml sample to dryness, ashing the residue at 550°C, mixing the ash with graphite and arcing by a standard dc arc technique. The method offers advantages over previously used procedures. It may be used for the determination of Fe, Al, Cr, Mo, Ni, Co, Pb, Sn, V, Cu, and Mn. The Pb content of bottled beer was found to range from 0.005-0.04 ppm (av 0.02).

4002 Teisinger, J. (Karlova Univ., Prague, Czechoslovakia): POLAROGRAPHIC METHODS IN INDUSTRIAL TOXICOLOGY. Technical Digest (Prague) 5, No. 5:33-5, 1963.

The significance of polarographic methods for the determination of low concentrations of substances in the atmosphere and in biological material is pointed out. The polarographic determination of Pb in blood, as developed by Czechoslovak authors, does not require preliminary mineralization of the sample. The Pb which is normally firmly bound to the red blood cells and plasma proteins is brought into solution by treatment with HCl. After a few simple operations, amounts of Pb as low as several tenths or hundredths of a µg/ml can be determined directly by polarography. A sample of only 4 ml of blood is required. A sensitivity of this order can otherwise be achieved only by spectrographic methods which require expensive equipment and complicated procedures. Several chemical methods, such as the use of dithizone, have been used in combination with polarography rather than colorimetry. The method is also very useful in the determination of Pb in urine after mobilization with $CaNa_2EDTA$, even many years after the individual has been removed from Pb exposure.

4003 Thielen, W.C., Alcocer, A.E., and Helwig, H.L. (Calif. State Dept. of Public Health, Berkeley): X-RAY SPECTROGRAPHIC DETERMINATION OF MICROGRAM QUANTITIES OF LEAD. American Chemical Society, Division of Water Waste Chemistry, Preprints 1963 (March-April):316-9.

In a sampling program for airborne particulate Pb the analysis of Pb dithizonate of digested filters was compared with the direct X-ray spectrographic analysis of the untreated filter. (From Chemical Abstracts 62:991, 1965)

4004 Van Calker, J., and Wischgoll, B. (Univ. Münster, Germany): Quantitative spektrochemische Untersuchungen mit Lichtbogenanregung an biologischen Analysenmaterialien. (QUANTITATIVE SPECTROCHEMICAL INVESTIGATIONS WITH ARC LIGHT EXCITATION IN BIOLOGICAL ANALYSIS.) Zeitschrift für Analytische Chemie 198:107-11, 1963.
Many sources of error interfere in the spectroscopic analysis of water-containing biological materials. These can be avoided by drying the solution to be analyzed on a strip of filter paper. The paper is placed in a hole in a C anode, where it is burned and excited in a dc arc (220 v, 8 amp) for 30 sec. The spectrum is measured with a Zeiss-Quartzspectrograph Q 24. The sensitivities of detection of various elements, in ppm in 0.1 g of water, blood, and urine, are given for Cd, Be, Hg, Sb, Au, Tl, Sn, In, Bi, Ag, and Pb; for the latter, these were (wavelength 2833) 0.5, 1, 1. The average error was 10-15%.

4005 Viller, G.E.: (DETERMINATION OF TOTAL LEAD IN URINE.) Mikroelementy v Sibiri, Akad. Nauk SSSR, Sibirsk. Otd., Buryatsk. Kompleksn. Nauchn.-Issled. Inst., Inform. Byul. 2:116-7, 1963.
An improvement of the oxidation of urine samples with K chromate was described. (From Chemical Abstracts 63:7552, 1965)

4006 Visintin, B., Monteriolo, S., and Giuseppi, S.A. (Inst. of Hyg., Rome, Italy): (POLAROGRAPHIC DETERMINATION OF LEAD, CADMIUM, TIN, AND ZINC IN WATER.) Atti delle Giornate di Studio sulla Analitica e Chimica Fisica delle Acque Naturali (Proceedings of Symposium on the Analysis and Physical Chemistry of Natural Waters) Livorno, Sept. 27-8, 1963, pp. 102-11; Annali di Idrologia 1, No. 4:212-21, 1963.
The possibility of contamination of drinking water by traces of heavy metals, salts of which have been employed as stabilizers in polyvinyl chloride used for the water pipes, poses the problem of a rapid method of determination of microquantities of these metals, especially of those which have a toxic effect. In this study, the determination of Pb, Cd, Sn and Zn is discussed. Since most plastics used for water pipes contain 2 or more of these metals simultaneously, the polarographic method was selected as the most suitable one. The water sample was concentrated by evaporation, organic matter was destroyed by adding nitric and sulfuric acids and the metals to be determined were coprecipitated with Ca carbonate. The polarograms were taken with a Sargent XXI polarograph. The average error of the procedure was 3.6% for Pb, 2.7% for Sn, 5.6% for Cd and 0.9% for Zn. The sensitivity of the method in mg/l was: Pb, 0.015; Cd and Sn, 0.005; Zn, 0.02.

4007 Yanagisawa, S., Hashimoto, Y., and Mitsuzawa, S. (Keio Univ., Tokyo, Japan): (DETERMINATION OF DUST CONSTITUENTS IN AIR.) Bunseki Kagaku 12, No. 11:1040-6, 1963.
Suspended dust particles whose diameters are >3μ and the smaller ones are collected with a filter paper dust collector and a small hand-made ac dust precipitator connected in series, by passing the air through these at a rate of 400 l/hr. The filter paper used was ashed, weighed, fused with Na_2CO_3, and extracted with HCl. The contents of Al, Mg, and Fe in the extracted solution were determined by emission spectrographic analysis with the soak-up electrode. The dust precipitated on an electrode of the precipitator was rinsed in methyl alcohol under ultrasonic oscillations of 200 kc/sec, weighed after evaporating the solvent, and treated by the above procedure. With this method, the same constituents in the deposited dust as well as suspended dust collected at various places in Tokyo and Yokohama were analyzed. The proposed method was also applied for the determination of Pb in the exhaust gas of an automobile.

4008 Zore, V.A., and Tikhonova, Z.I. (I.M. Sechenov 1st Med. Inst., Moscow, USSR): (SIMULTANEOUS SPECTROGRAPHIC DETERMINATION OF LEAD, COPPER, AND TIN IN FRESH FISH AND SOME CANNED PRODUCTS.) Gigiena i Sanitariya 28, 2:58-60 (Feb.), 1963.
A spectrographic method for the simultaneous determination of Pb, Cu, and Sn in fish and canned fish was reported. A 2.5-g sample was dried at 100-105° and ashed at 400-450°; 20 mg of the ash was then placed in the well of a C electrode and burned with a 14 ampere alternate-current arc. Pb, Cu and Sn in amounts of 0.0005% could be determined spectrographically in the residue with an error of <±5%. (From Chemisches Zentralblatt 1965, No. 10:Abstr. No. 2836; Chemical Abstracts 64:2670, 1966)

1964

4009 Adell, M.R., Gonzalez, F.A., Cellini, R.F., and Marti, F.B.(Inst. Quim, Fis. "Rocasolano," Madrid, Spain): (DIRECT READING SPECTROCHEMICAL ANALYSIS OF SOILS AND PLANT ASHES.) Anales Real Sociedad Espanola de Fisica y Quimica (Madrid) Series B 60, No.6:469-80, 1964.
Limits of detection are given for various oxides including Pb oxide when present in <10 ppm. The precision was ±5-15%. (From Chemical Abstracts 62:9724, 1965)

4010 Angelieva, R.: (SPECTROGRAPHIC METHOD FOR THE QUANTITATIVE DETERMINATION OF Pb AND Cu IN INDUSTRIAL DUST.) Khigiena 7, No. 2:55-9, 1964.
Minimal amounts of Pb and Cu in settled dust were determined spectrographically. The method permits determination of 2 μg Pb in 0.020 g dust. (From Chemical Abstracts 62:7103, 1965)

4011 Anonymous: Jad-na promokasku. (POISON ON BLOTTING PAPER.) Ohrana Truda i Social'noe Strahovanie, Moscow, U.S.S.R., 7:33 (Oct.), 1964
A simple apparatus, patented in the USSR, is described for rapid detection of tetraethyllead

(TEL) in hazardous workplaces. It consists of a chamber fitted with a built-in ultraviolet lamp and a photometer. The air to be monitored is passed through the chamber for a few minutes; any TEL present is decomposed by the ultraviolet light and the Pb deposited on a strip of filter paper. The paper belt moves forward to a dropper from which Na sulfide is dropped on the paper. If Pb is present, a dark spot forms. The paper belt then moves on to the photometer where the degree of darkening is monitored. The photometer scale is graduated so that the TEL concentration may be read off directly in mg/l. (From Occupational Safety and Health Abstracts 3:242, 1965)

4012 Arievich, M.N. (Inst. Ind. Hyg. and Occup. Diseases, Moscow, USSR): K metodike vyyavleniya bazofil'noi zernistosti v eritrotsitach. (TECHNIQUE FOR DETECTING BASOPHILIC STIPPLING IN ERYTHROCYTES.) Gigiena Truda i Professional'nye Zabolevaniya 8:59-61 (June), 1964.

The technique presently used for detecting basophilic stippling of erythrocytes in blood smears stained with methylene blue is considered to have insufficient sensitivity, as the granulations are very fine and difficult to see under the microscope. The "enrichment" technique developed by D.I. Goldberg (1948), in which smears are placed in a humid chamber for slower drying, is recommended. Also counts/10,000 erythrocyts are recommended as this enables the technician to compare quantitatively the stippled cells and the number of reticulocytes. A comparative study of 100 essentially healthy individuals, 32 with radiation exposure, and 31 with exposure to Pb gave the following values, respectively: reticulocytes, 6.4, 7.9, 13.5/1000; basophils (without "enrichment"), 0.11, 0.74, 2.1; basophils (with "enrichment"), 0.86, 2.67, 4.97/1000; index of pathologic regeneration, 14.8, 33.7, 35.5.

4013 Aronson, A.L., and Hammond, P.B.: FASTER ANALYSIS FOR Pb^{210} IN BIOLOGICAL SPECIMENS. Nucleonics 22, No.2:90-2, 1964.

The availability of the Pb isotope (^{210}Pb) has greatly increased the analytical sensitivity possible in experimental Pb poisoning, particularly in organs that contain small quantities of Pb. A disadvantage is the necessity of holding specimens for at least 35 days before counting ^{210}Bi, its 1st daughter which emits a β of relatively higher energy than that of ^{210}Pb. The authors found that ^{210}Pb activity can be evaluated prior to secular equilibrium with ^{210}Bi by separating the 2 by means of dithizone at pH 3.8-3.9, and holding the specimens at least 11 days before counting. Recovery of ^{210}Pb is quantitative regardless of the tissue involved when >4 μg of stable Pb are present in the aliquot analyzed.

4014 Barni, I. and Querci, V. (Univ. Siena, Italy): SPECTROPHOTOMETRIC DETERMINATION OF LEAD IN THE BLOOD AFTER EXTRACTION WITH METHYL-ISOBUTYL-KETONE. Medicina del Lavoro 55:7-11 (Jan.), 1964.

Methods for the determination of Pb in biological fluids are briefly reviewed. Based on their experience in the Institute for Forensic Medicine in Siena, the authors' preferred method for the determination of Pb in urine is that of McCord and Zemp (see Abstract No. 3672) who use methyl isopropyl ketone for extraction. Some slight modifications are necessary when this method is applied for estimation of Pb in blood. Organic matter must be destroyed by Kjeldahl digestion, methyl isobutyl ketone is used instead of methyl isopropyl ketone and a Beckman DU spectrophotometer instead of a Coleman one. The method described is very sensitive, requires <3 hr and permits working with small samples.

4015 Belyaev, Yu.I., Kostin, B.I., and Tamont'ev, V.P.: (QUANTOMETER FOR ANALYSIS OF SOILS AND PLANTS.) Agrokhimiya 1964, No. 5:130-6.

The Quantometer, a multichannel automatic photoelectric recorder used in the spectrographic determination of metals, has been applied to the determination of Pb, Sr, Cr, Cu, Mn, Ni, Zn, V, and Mo in soils and plants. The reproducibility of triplicate repetition is 12-1[illegible] Since only 10-12 min is needed for triplicate determinations, this method is 3-4 times faster than photographic methods of spectral analysis. (From Chemical Abstracts 62:3380, 1965)

4016 Berman, E. (Illinois Masonic Hosp., Chicago): THE DETERMINATION OF LEAD IN BLOOD AND URINE BY ATOMIC ABSORPTION SPECTROPHOTOMETRY. Atomic Absorption Newsletter 3:111-4 (Oct.), 1964.

A method for the determination of Pb in the organic phase of atomic absorption spectrophotometry is described. In the case of blood, the method involves only precipitation of blood proteins, addition of ammonium pyrrolidine dithiocarbamate and extraction with methyl isobutyl ketone. For urine, the sample is simply acidified before extraction into the organic phase. The Pb contents of blood from patients with probable Pb intoxication were determined by both atomic absorption and the colorimetric dithizone extraction method; the findings showed good agreement. When the Pb content in blood from 50 patients with no known Pb exposure was measured by atomic absorption, 10% of those tested showed levels of 20 μg/100 ml and the remaining 90% had lower levels. The urinary Pb concentration was <20 μg/l in 74% of this group, between 20-40 ug in 20% and between 40-60 ug in 6%. The detection limit of the method is ~20 μg Pb/l urine or /100 ml blood. Ethylenediaminetetraacetate (EDTA) interferes with the described extraction of Pb. However, urinary Pb in patients in EDTA therapy can be determined by direct aspiration of the sample into the flame, provided the quantity of Pb is ≥200 μg/l. Penicillamine does not interfere with the usual extraction procedure.

4017 Bertrand, D. (Inst. Pasteur, Paris, France): Methodes chimiques de dosage des oligoelements, a usages biologiques. (CHEMICAL METHODS OF ANALYSIS OF TRACE ELEMENTS HAVING BIOLOGICAL SIGNIFICANCE.) Annales de la Nutrition et de l'Alimentation 18, No. 1: A1-A69, 1964.

The method for the determination of Pb as described in this paper is applicable to the estimation of Pb in amounts as low as 0.3 µg. The separation and determination, using dithizone, are described in detail.

4018 Bozhevol'nov, E.A., and Solov'ev, E.A.: (EXPRESS METHOD FOR THE DETERMINATION OF SMALL AMOUNTS OF LEAD.) Zavodskaya Laboratoriya 30, No.4:412-3, 1964.

The determination of trace amounts of Pb is based on a very intense luminescence of Pb chloride complexes at low temperatures. The method permits determination of 1 µg Pb in 1 ml of a solution. Most metals when present in amounts 10 times those of Pb do not interfere, but trivalent Fe and bivalent Cu in a similar excess will quench the fluorescence. (From Chemical Abstracts 61:2470, 1964)

4019 Byczkowski, S., Senczuk, W., and Hac, E. (Med. Acad., Gdansk, Poland): Ocena niektorych metod oznaczania ołowiu we krwi. (EVALUATION OF METHODS FOR THE DETERMINATION OF LEAD IN BLOOD.) Rozprawy Wydzialu III, No. 1:5-14, 1964.

The Pb content in blood was determined colorimetrically, using dithizone, or by polarography. For the colorimetric determination, the material was either wet- or dry-ashed. The method was applied to 3 samples, one containing a physiological amount of Pb, the 2nd 70 mg% and the 3rd 143 mg%. Statistical evaluation of the results indicated that dry-ashing yields comparatively the smallest errors over a wide range of concentrations; besides, this method was the most convenient one. Direct polarographic determination gives results with large errors and is not applicable for low, such as physiological, Pb contents in blood. (From authors' English summary)

4020 Cecchetti, G., Ramusino, F.C., and Intonti, R. (Inst. Health, Rome, Italy): Determinazione di alcuni elementi nelle materie plastiche mediante la spettrografia di fluorescenza da raggi X. Nota I - Piombo nel cloruro di polivinile (CPV). (DETERMINATION OF SOME ELEMENTS IN PLASTICS BY X-RAY FLUORESCENCE SPECTROGRAPHY. I. LEAD IN POLYVINYL CHLORIDE.) Metallurgia Italiana 56, No. 8:333-7, 1964.

Small amounts of Pb in polyvinyl chloride food containers and polyvinyl chloride pipes for municipal water supplies could be determined by spectrographic X-ray fluorescence while optical emission spectroscopy was used for qualitative analysis. According to legislation adopted in January 1963, plastics containing Cu, Pb, Cd, and Sn based stabilizers are not permitted to come in contact with food, and in plastic water pipes, the Pb content may not exceed 0.015% and that of Cd, 0.002%.

4021 Cholak, J. (Univ. Cincinnati, Ohio): ANALYTICAL METHODS FOR DETERMINATION OF LEAD. Archives of Environmental Health 8:222-31 (Feb.), 1964.

The collection of biological samples and air samples is described. The need for precuations against contamination is emphasized. The analytical laboratory should be removed from production areas and equipped with air-cleaning systems. Production people in work clothes should not be admitted. The colorimetric, spectrographic and polarographic methods for the determination of Pb are discussed in detail, and their applicability, reliability, advantages and disadvantages are pointed out. The colorimetric dithizone method is the method of choice; it is economical, requires no unusual equipment, is adequately sensitive and possesses good reproducibility and accuracy. Quantities of 0.5 µg can be detected with a precision of ±0.5 µg and with some modifications as little as 0.2 ± 0.1 µg can be determined.

The selection of a method will depend upon the equipment available, the training and personal preferences of the investigator and the nature of the problem. While any of the chemical or instrumental procedures can be used directly or modified to yield reliable results, the latter are possible only when the investigator has an intimate knowledge of all of the problems and difficulties associated with this work. Continued daily use of a procedure and the proficiency of the analyst are essential for reliable analyses. For this reason, it is advised that samples be sent to a laboratory in which such work is done regularly, with all necessary precautions against chance errors, rather than doing them on a sporadic basis by different technicians.

4022 Da Cunha, O.R.P., and Da Cunha, A.M.A.P.: (COLORIMETRIC DETERMINATION OF LEAD IN BIOLOGICAL FLUIDS.) Bol. Escola Farm., Univ. Coimbra, Ed. Cient. 24:164-73, 1964.

Modifications of Truhaut and Boudene's titrimetric and spectrophotometric methods for the determination of Pb in urine and blood are described. (From Chemical Abstracts 62:15057, 1965)

4023 Djuric, D. (Inst. Occup. Health, Beograd, Yugoslavia): FLUORIMETRIC DETERMINATION OF PORPHYRINS. REPORT OF A SENSITIVE METHOD. Archives of Environmental Health 9:742-4 (Dec.), 1964.

Since Pb poisoning is associated with porphyrinuria, the determination of porphyrins is considered as one of the most valuable laboratory findings in suspected Pb intoxication. A new sensitive method for the determination of extremely low concentrations of porphyrins is presented. It is based on measurements of fluorescence of porphyrin when absorbed on Mg hydroxide. The procedure for determining urinary coproporphyrins (CP) is given as an illustration. The CP's are extracted from an acidified sample of 24-hr urine by shaking with ether, then after washing, removed from the ether by extraction with HCl acid. If the fluorescence of this acid extract is too low to be measured, it is treated with NaOH and Mg sulfate, and shaken vigorously which causes the immediate precipitation of Mg hydroxide with complete absorption of CP. Fluorescence must be measured quickly before the suspension settles. A double extraction is necessary in cases of old urine samples. The method is adaptable for other kinds of porphyrins in fluids other than urine when the concentration of porphyrin is very low.

4024 Dubois, L. and Monkman, J.L. (Environ. Health Centre, Ottawa, Ont., Canada): POLAROGRAPHIC DETERMINATION OF HEAVY METALS IN AIR SAMPLES. American Industrial Hygiene Association Journal 25:485-91 (Sept.-Oct.), 1964.

A polarographic method for the determination of Pb in air is described. Two commercial polarographs, the Swiss Metrohm E 261 and the Sargent model XXI are compared and both found adequate for the analysis of Pb. Recovery for 20, 40, and 60 μg of added Pb were 100, 102 and 101.5%, respectively. The method is considered as precise, accurate, and sensitive, and results may be obtained very rapidly.

4025 Everett, R.J., Brewer, L.W., Edwards, G.W., Jack, A.J., Linn, T.A.,Jr., and Mills, R.O. (Sandia Corp., Albuquerque, N. Mexico): CHEMICAL AND RADIO-CHEMICAL ANALYTICAL PROCEDURES. US Atomic Energy Commission Document No. SC-4783 (RR), 1964, 79 pp.

The report includes an abstract on the determination of Pb in air, swipes, and urine. Samples are oxidized with concentrated nitric acid and heat and interfering elements complexed with ammonium citrate and K cyanide. Pb is measured photometrically as the dithizone complex.

4026 Ferencik, M. (State Veterinary Inst., Bratislava, Czechoslovakia): (POSSIBILITIES OF THE USE OF PAPER CHROMATOGRAPHY AND HIGH-VOLTAGE ELECTROPHORESIS IN THE DETERMINATION OF INORGANIC SUBSTANCES IN TOXICOLOGY.) Chem. Listy 58, No. 2: 205-10, 1964.

Inorganic cations and anions in veterinary toxicology may be determined by disk chromatography. The method is applicable for the determination of bivalent Pb. (From Chemical Abstracts 60:12350, 1964)

4027 Ghelberg, N.W.,and Puscasiu, M. (Inst. of Public Hyg., Cluj, Romania): (POLAROGRAPHIC DETERMINATION OF TRACES OF METALS IN WATER.) Igiena (Bucharest) 13, No. 4:347-52, 1964.

A 1500-ml water sample was evaporated in a double boiler until dry and the residue calcined in an electric oven at 400-450°. A 1:1 solution of hydrogen chloride was added 2 or 3 times and again evaporated until dry. Doubly-distilled water was added to the final residue which was then heated in a double boiler and filtered, and the volume was adjusted with doubly-distilled water to a volume of 50 ml. The polarograms were then obtained. Pb was determined to within 0.015 mg/l. (From Chemical Abstracts 62:11529, 1965)

4028 Grebenshchikova, V.A.: (POLAROGRAPHIC DETERMINATION OF COPPER, ZINC, LEAD, AND CADMIUM IN DRINKING WATER.) Materialy 6-oi (Shestoi) Itog. Nauchn.-Prakt. Konf. Kazakhsk. Inst. Epidemiol. Mikrobiol. i Gigieny, Alma-Ata, Sb. 1964:144-6.

Cu, Zn and Cd were determined with an ammonium chloride inert electrolyte; Pb was determined with HCl and $CaCl_2$ inert electrolytes. The sensitivity of the method was 10^{-3}-10^{-4}M and the error ±3-10%. (From Ref. Zhur., Khim. 1965:Abstr. No. 161161; Chemical Abstracts 64:6303, 1966)

4029 Hauck, G. (Univ. Freiburg, West Germany): Blut-Bleibestimmung mittels Röntgenfluorescenz. (DETERMINATION OF LEAD IN BLOOD BY X-RAY FLUORESCENCE.) Deutsche Zeitschrift für die Gesamte Gerichtliche Medizin 55:140-2 (Sept.), 1964.

Among the known methods for the determination of Pb in blood, the dithizone method, polarography and spectrography require chemicals which usually are not completely free of Pb and therefore may produce inaccurate results. No chemicals are needed when X-ray fluorescence is used. Blood samples of 10 g each were dried, pressed into tablets and the Pb content was measured by X-ray fluorescence. The method permits the determination of as little as 0.5 μg/10 g blood. The determination can be completed within 4 hr with an actual work expenditure of 35 min, compared to more than a day and 120 min, respectively, for the dithizone method.

4030 Hoschek, R. (Stuttgart, Germany): Eine neue Methode zur Schnellbestimmung von Porphyrin im Harn. (A NEW METHOD FOR RAPID DETERMINATION OF PORPHYRIN IN URINE.) XIVth International Congress of Occupational Health, Madrid, Spain, Sept. 16-21, 1963. International Congress Series No.62, Vol. II: 761-3, 1964.

A rapid method for the determination of poryphyrin for the regular surveillance of Pb workers was described. By adding Ehrlich's Reagent to the urine, the normal yellow-green fluorescence is extinguished and only the red fluorescence of porphyrins, which is visible through a red filter, remains. Instead of the difficultly procurable 24-hr sample, fresh morning urine is used. The method has an accuracy of 10 μg%.

4031 Hranisavlizevic-Jakovljevic, M., Pejkovic-Tadic, I., Jakovljevic, K., and Miljkovic-Stojanovic, J. (Fac. Sci., Inst. Chem., Belgrade, Yugoslavia): (THIN-LAYER CHROMATOGRAPHY OF INORGANIC IONS. II. SEPARATION OF METAL DITHIZONATES.) Glasnik Hem. Drustva, Beograd 29, No. 3-4:115-20, 1964.

Dithizonates of Hg, Cu, Bi, Zn, Pb, Cd, Co, and Ni are separated by thin-layer chromatography. The metals are extracted from an aqueous solution with a 0.1% solution of dithizone-chloroform; Pb is extracted at pH 5. It is not necessary to develop the chromatogram as the dithizone complexes have different colors. The metals can be determined by μg quantities. (From Chemical Abstracts 64:16599, 1966)

4032 Ilcewicz, F.H., Holtzman, R.B., and Lucas, H.F., Jr. (Argonne Natl. Lab., Argonne, Ill.): RAPID SPECTROPHOTOMETRIC METHOD FOR THE DETERMINATION OF LEAD IN BONE ASH. Analytical Chemistry 36:1132-5 (May), 1964.

The measurement of the absorbance of the chloro-complex of Pb in 9M hydrochloric acid at 271 mμ provides a simple and rapid method for the analysis of microgram quantities of Pb in bone ash. Interfering ions were removed by extraction with triiso-octylamine. The sensitivity of the method was 0.1 μg/ml and the standard error for Ca phosphate-Pb standards was ±2%. The procedure has been used for Pb determinations in samples of bone ash containing 6-80 ppm Pb.

4033 Ito, M., and Musha, S. (Prefect. Univ., Osaka, Japan): (AUTOMATIC DETERMINATION OF LEAD IN WATER BY MEANS OF SINGLE-SWEEP POLAROGRAPHIC METHOD WITH CONTINUOUSLY CHANGING POTENTIAL.) Kogyo Kagaku Zaashi 67, No.11:1807-10, 1964.

Concentrations of 2-50 x 10^{-6}M of bivalent Pb in water were determined with a relative error of 2.5% by means of an automatically operating single-sweep polarograph using anodic stripping. (From Chemical Abstracts 62:8831, 1965)

4034 Kashtan, M.S., Khlopina, T.N., Sobotovich, E.V., and Lovtsyus, A.V.: (COMPARISON OF THE RESULTS OF DETERMINATION OF ISOTOPIC COMPOSITION OF LEAD MADE BY SPECTRAL AND MASS-SPECTROMETRIC METHODS.) Metody Opred. Absolyutn. Vozrasta Geol. Obrazovanii (Moscow:Nauka) Sb. 1964, No. 6:67-71.

An improved apparatus for the mass-spectrometric determination of Pb is described. The amount of Pb necessary for analysis is ~0.05 mg. The mass-spectrometric determination of Pb is more accurate than the spectral method but requires more time. (From Referat. Zhur., Geol. V. Geokhim., Mineralog., Petrogr. 1965:Abstr. No.2V567; Chemical Abstracts 63:2797, 1965)

4035 Keenan, R.G. (Div. Occup. Health, US Pub. Health Serv., Cincinnati, O.): APPLICATION OF THE EMISSION SPECTROGRAPH TO THE ANALYTICAL NEEDS OF THE INDUSTRIAL HYGIENE LABORATORY. American Industrial Hygiene Association Journal 25:481-4 (Sept.-Oct.), 1964.

The principles of emission spectroscopy and qualitative, semiquantitative and quantitative methods of spectrographic analysis as they apply to the determination of the metallic constituents of body tissues and fluids were discussed. The sensitivity of quantitative spectrographic analysis of Pb, using a Li chloride-graphite buffer, was stated as follows for the lower end of working range: 0.002 μg/2 mg ash; 1 ppm in ash; 0.015 ppm in fresh tissue.

4036 Korkisch, J., and Feik, F. (Univ. Vienna, Austria): SEPARATION OF LEAD BY ANION EXCHANGE. Analytical Chemistry 36:1793-6 (Aug.), 1964.

The method described employs the strongly basic anion exchange resin Dowex 1, X8. As a medium for the separation, a mixture consisting of 90% tetrahydrofuran and 10% 5 N nitric acid was selected. From this solution Pb is absorbed much more strongly on the resin than most other elements, so that an ion exchange separation by column chromatography by using the mixture as the eluant, is easily possible. U, Th, Bi, Tl, the lanthanides from Sm to Lu, Fe, Mg, Ca, and other elements pass quantitatively into the eluate, whereas the rare earth elements La to Nd are retained on the resin with Pb which is subsequently eluted with a mixture of 80% tetrahydrofuran and 20% 2.5 N nitric acid. The method could be applied to a variety of materials, including foods and body fluids. (From authors' summary)

4037 Linch, A.L., Davis, R.B., Stalzer, R.F. and Anzilotti, W.F. (E.I. du Pont de Nemours Co., Inc., Wilmington, Dela.): STUDIES OF ANALYTICAL METHODS FOR LEAD-IN-AIR DETERMINATION AND USE WITH AN IMPROVED SELF-POWERED PORTABLE SAMPLER. American Industrial Hygiene Association Journal 25:81-93 (Jan.-Feb.), 1964.

The portable "Uni-Jet" Pb-in-air analyzer was revised to provide constant-rate collection of TEL and TML. Reliable results from monitoring leaded gasoline storage tanks, cleaning and decontamination procedures were obtained by drawing a 2 ft^3 sample during 20 min through methanolic I. Under normal operating conditions, the precision of the method was ±0.1%. The device has been adapted to the determination of inorganic Pb-in-air. Maximum atmospheric concentrations currently employed for inorganic Pb, leaded gasoline tanks and Pb alkyl manufacturing as adopted, and the numbers as applied in practice, which have created some confusion and misunderstanding, are given. These are, respectively: in mg/m^3, 0.2, 0.15, 0.075; in $\mu g/ft^3$, approximately 5.7, 4.0, 2.0; actual, 5.66, 4.25, 2.13; in ppm by weight, 0.166, 0.125, 0.063.

4038 Lockhart, L.B., Jr., and Patterson, R.L., Jr. (US Naval Research Lab., Washington, D.C.): TECHNIQUES EMPLOYED AT THE U.S. NAVAL RESEARCH LABORATORY FOR EVALUATING AIR-BORNE RADIOACTIVITY. In Adams, J.A.S., and Lowder, W.M., ed.: The Natural Radiation Environment. Chicago, Univ. of Chicago Press, 1964, pp. 279-89.

The study of atmospheric radioactivity which was initiated by the U.S. Naval Research Laboratory in 1948 for the detection of nuclear explosions, also served to give information on some of the natural radioactive components of the atmosphere. Sampling procedures involved rain collection and air-filtration techniques, the latter being preferred for reasons of convenience, reliability and simplicity. Isotopes separated from rain water included ^{210}Pb which was identified by measurement of its daughter, ^{210}Bi. The air-monitoring program permitted determination of the ^{222}Rn daughters (^{214}Pb and ^{214}Bi) and ^{220}Rn daughters (^{212}Pb and ^{212}Bi). A formula for the calculation of ^{214}Pb and ^{212}Pb is presented. Data on the ^{210}Pb content of air at ground level have been obtained from air-filter samples collected along the 80th meridian as part of a cooperative program. Results of these analyses are given in the paper by Patterson and Lockhart (see Abstract No. 3415).

4039 Lombardi, O.W. (US Naval Ordnance Test Station, China Lake, Calif.): DI-β-NAPHTHYLTHIOCARBAZONE (DINAPHTHIZONE) COMPARED WITH DITHIZONE AS AN ANALYTICAL REAGENT FOR THE DETERMINATION OF TRACE METALS IN NATURAL WATERS. A PRELIMINARY INVESTIGATION. Analytical Chemistry 36:415-8 (Feb.), 1964.

The comparative extractability of various metals with dinaphthizone and dithizone was tested in the 10^{-7}-10^{-6} molar range in various kinds of water, using chloroform as the extractant at room temperature. Three California waters were tested: summer brine from Owens Lake, pH 10.5; sea water near Santa Catalina, pH 8.5; and fresh water from Lyman Creek, Deep Springs Valley, pH 8.5-9.0. Extractability was determined in 100-200-ml samples to which 5×10^{-8} g equivalents of the cation were added. The results were influenced by pH and salinity of the sample and the metal to be determined. Dinaphthizone was superior in determining trace metals in alkaline lake brines, while below pH 8 dithizone was preferable. For Pb, the per cent extractability, valid to ±20%, with dinaphthizone and dithizone, was: Owens Lake brine, 100, 70; sea water, 80, 90; fresh water, 80, 90, respectively.

Another set of experiments was run to show the comparative behavior of chloroform solutions of dinaphthizonates and dithizonates with various complexing agents or stripping solutions (0.1N solutions of ascorbic acid, H_2SO_4, HCl, HBr, KCN and 4 solutions of HCl and HBr). The dinaphthizonates proved to be slightly more stable than the corresponding dithizonates. KCN removed only 0-15% Pb from both the chloroform-dinaphthizone and -dithizone phase; all other stripping agents tested removed 85-100%.

Experiments to determine several metals with dithizone in a single aliquot were successful for a semiquantitative determination of Zn, Cu and Pb in sea water. At Pb concentrations of 0.2 ppb, a 1-liter sample was required; at the 1-ppb level, 200 ml were sufficient.

Experiments were also performed, using dinaphthizone-chloroform extractions as a method of concentrating trace metals for cathode-ray polarography. Pb, Cd, and Zn effected a quantitative transfer from chloroform phase to aqueous phase both with dithizone and dinaphthizone; the other metals did not effect such transfer though colorimetry indicated quantitative transfer.

4040 Markov, K.P., Ryabov, N.V., and Stas, K.N.: Metod nepreryvnogo kontrolya velichiny "skrytoi" energii. (METHOD OF CONTINUOUS MONITORING OF THE MAGNITUDE OF LATENT ENERGY.) Gosudarstvennyi Komitet po Ispol'zovaniyu Atomnoi Energii SSSR. Report No. 108, 1964. 14 pp.

Problems of continuous monitoring of the latent energy of Rn daughter products including ^{214}Pb were studied using a continuous moving filter belt and a filter with periodic motion. Precipitation of dispersion phase aerosols on the continuous filter belt combined with effective control of the relation between the number of the RaA and RaC decays, and the magnitude of the latent energy proved more efficient than more complex operations with periodic belts. (From Nuclear Science Abstracts 19:Abstr. No. 36704, 1965)

4041 Nangniot, P. (Inst. Super. Agron., Gembloux, Belgium): (THE OSCILLOPOLAROGRAPHIC DETERMINATION OF TRACE METALS IN VEGETABLE MATTER.) J. Electroanal. Chem. 7, No. 1:50-9, 1964.

Linear sweep oscillopolarographic determinations are reported for Bi, Cd, Co, Cu, Mn, Mo, Ni, Pb, Sn, Tl, V, and Zn occurring in traces in vegetable matter. Detailed procedures including combustion of organic matter and separation of the various elements are given. (From Chemical Abstracts 60: 13549, 1964)

4042 Nestorescu, V.B. (Clin. Occup. Diseases, Bucharest, Romania): (A METHOD FOR THE RAPID DETERMINATION OF LEAD IN URINE.) Igiena (Bucharest) 13, No. 3:257-62, 1964.

Urine was boiled for 15 min with nitric acid and then reacted with K permanganate and ammonium chlorhydrate until the brown precipitate formed during boiling was dissolved. The solution was treated with additional ammonium chlorhydrate and ammonium citrate-potassium sulfite-potassium cyanide buffer, then Pb was determined photocolorimetrically by dithizone. (From Chemical Abstracts 62:809, 1965)

4043 Ogawa, T. (Yokohama Natl. Univ., Japan): HANGING MERCURY ELECTRODE. COULOSTATIC ANALYSIS BY INK-PEN RECORDER. Bulletin of the Faculty of Engineering, Yokohama National University 13:23-33, 1964.

Small quantities of Pb can be determined by using a recorder which records directly the potential decay curves on a chart paper. Pb amounts ranging from 5×10^{-7}-5×10^{-5}M were determined with an accuracy of ±2% within 30-40 min. (From Chemical Abstracts 61:13852, 1964)

4044 Petrova, A.G., Razumov, V.A., and Aidarov, T.K.: DETERMINATION OF LEAD IN AIR AND IN BIOLOGICAL MATERIALS. Zavodskaya Laboratoriya 30, No. 9:1095-6, 1964.

The Pb line is measured at 2833 Å with a mean square error of 5-20%. Na and K have a marked effect on the line intensity; Fe, Sn, Mn, Cr, Al, Cu, Cd and Sb do not interfere. (From Chemical Abstracts 62:3052, 1965)

4045 Pilloni, G. and Plazzogna, G. (Univ. Padua, Italy): Analisi coulombo-amperometrica di piombotetrametile e piombotetraetile con Br_2 e Hg_2^{2+}. (COULOMETRIC TITRATION OF TETRAMETHYLLEAD AND TETRAETHYLLEAD WITH ELECTROGENERATED Br_2 AND Hg_2^{2+}.) Ricerca Scientifica 34 (II-A):27-63, 1964.

The determination of TML and TEL by means of coulometric bromination and mercurization at a constant current with amperometric end point (deadstop) is described. The accuracy of the method is in the order of 0.2-2%, based on the amount of organometallic product present. (17 references)

4046 Polyarkov, Yu.N.: (AMALGAM-POLAROGRAPHIC DETERMINATION OF MICRO-QUANTITIES OF CERTAIN METALS.) Materialy Nauchn.-Prakt. Konf. po. Probl. Endemich. Zoba i Mikroelementov, Kazan, Sb. 1964:223-5.

Amounts of $\leqq 10^{-8}$ g-ion/l of Cd, Pb, Tl and In were determined by amalgam polarography in pure solutions on a Hg drop obtained by electrolysis on a Pt contact. Mean quadratic error was 5-15%. (From Referat. Zhurn. Khim. 1965:Abstr. No. 16G46; Chemical Abstracts 64:7352, 1966)

4047 Potapov, M.P.: (DETERMINATION OF TRACE IMPURITIES OF HEAVY METALS IN PRESERVED MEATS BY AMALGAM POLAROGRAPHY.) Kon-

servnaya i Ovoshchesushil'naya Promyshlennost 19, No. 5:39-43, 1964.
The contents of Cu, Pb and Zn in preserved meat were determined by amalgam polarography, using 0.1 N NaOH as supporting electrolyte, except for preserved fish. Because of high Ca content, 0.1M NaF or 0.5M Na tartrate was suitable. (From Chemical Abstracts 61:11247, 1964)

4048 Potapov, M.F., and Stromberg, A.G.: (DETERMINATION OF MICRO-ADMIXTURES OF INORGANIC SUBSTANCES IN PRESERVED PRODUCTS OF THE FOOD INDUSTRY BY AMALGAM POLAROGRAPHY WITH ACCUMULATION ON THE STATIONARY MERCURY DROP.) Khim. Analiz Tsvetn. i Redkikh Metal., Akad. Nauk SSSR, Sibirsk, Otd., Khim.-Met. Inst. 1964:44-54.
The simultaneous determination of micro amounts of Cu, Pb and Zn in preserved foods, in the presence of Fe and Sn, is described. The metal is accumulated on a stationary Hg drop electrode and then determined by anodic stripping polarography. Three parallel tests could be run in <8 hrs with an error not exceeding ±10%. (From Chemical Abstracts 63:4642, 1965)

4049 Potylitsyna, L.G., and Stolyarov, K.P.: (LUMINESCENCE REACTIONS WITH THIOUREA.) Vest. Leningr. Univ. 19, No. 22. Ser. Fiz. i Khim. 1964, No. 4:136-44.
Thiourea was used to detect microgram amounts of Te, Ag, Pb, Pt and Au. The compounds luminesce upon excitation by ultraviolet radiation from a quartz Hg lamp. For the determination of 0.05 μg Pb, a drop of thiourea solution was added to a solution of Pb nitrate and the crystals were moistened with a solution of Na sulfate before the luminescence spectra were determined. The sensitivity of the tests decreased about 10-fold when they were performed as spot tests on filter paper. (From Chemical Abstracts 62:11148, 1965)

4050 Rautu, R.: (LEAD, COPPER, AND ZINC DETECTION IN FOODS.) Standardizarea 16, No. 12:626-7, 1964.
Investigations were carried out in order to improve the existing methods for the detection of Pb, Cu and Zn which may contaminate foods during processing or subsequent to canning. The samples were ashed, and the ash was dissolved in HCl acid. Pb was determined as a yellow precipitate by precipitation with a 1% K bichromate solution from an aliquot of the Cl mixture. (From Abstr. Rumanian Tech. Lit. 1, No. 3:237, 1965; Chemical Abstracts 65:20744, 1966)

4051 Razumov, V.A., and Aidarov, T.K.: (CHEMICAL SPECTRAL MICRO DETERMINATION OF LEAD AND MERCURY IN AIR OF INDUSTRIAL BUILDINGS AND IN SOME BIOLOGICAL OBJECTS.) Tr. po Khim. i Khim. Tekhnol. 1964, No. 3:397-402.
The spectral determination of Hg and Pb in air, urine and blood was discussed and the influence of some other elements on the spectral line intensity Pb 2833 Å was studied. A new microdetermination of Pb in polluted air was described in detail. Air samples were collected in 7% acetic acid or 5% nitric acid by aspiration, buffered with 10 ml 10% NaCl solution/100 ml, and 0.06 ml of the resulting solution was placed in a C electrode which was previously coated with 3% polystyrene solution in benzene. Standards were prepared from Pb acetate. The absolute sensitivity of the method is 4 x 10^{-9}g, the relative sensitivity 5 x 10^{-6}%. (From Chemical Abstracts 65:1025, 1966)

4052 Razumov, V.A., and Aidarov, T.K.: (TETRAHYDROXY-p-BENZOQUINONE AS A SELECTIVE REAGENT FOR LEAD.) Zh. Anal. Khim. 19, No.6:746-8, 1964.
The photometric determination of Pb in aerosols, using 0.2% alcoholic tetrahydroxy-p-benzoquinone, is described. A pink spot after exposure on paper moistened with acetic acid and H peroxide proves the presence of Pb. (From Chemical Abstracts 61:7692, 1964)

4053 Sereda, G.A., and Vorontsova, A.S. (Inst. Ind. Hyg. and Occup. Pathol., Sverdlovsk, USSR): (DETERMINATION OF LEAD IN URINE BY THE USE OF ION EXCHANGE AND THE NEW REAGENT, SULFARSAZEN.) Gigiena Truda i Professional'nye Zabolevaniya 8, No. 2:55-7, 1964.
Pb is separated as the dithizonate and determined colorimetrically with sulfarsazen. The whole procedure takes 4-5 hr. The sensitivity is 1 μg Pb/50 ml urine.

4054 Sochevanov, V.G., and Shmakova, N.V.: (ELECTROLYTE FOR THE HIGH-SENSITIVITY DETERMINATION OF LEAD BY POLAROGRAPHY.) Spektral'n. i Khim. Metody Analiza Materialov, Sb. Metodik 1964:129-31.
The polarographic determination of Pb in concentrations as low as 0.5 x 10^{-6}M, in an acetate-ascorbic acid solution containing Cu is described. (From Chemical Abstracts 62:3395, 1965)

4055 Specht, W., and Rohner, D.: Ueber den Nachweis von Metallgiften (Thallium) durch Neutronen-Aktivierungsanalyse und Elektronenbeugung. (DETECTION OF METALLIC POISONS (THALLIUM) BY NEUTRON ACTIVATION ANALYSIS AND ELECTRON DIFFRACTION.) Acta Med. Leg. Soc. 17:27-38 (Apr.-June), 1964.
Trace concentrations of Tl204 formed by thermic neutron activation of Tl-containing body hair are easily detected. Advantages of this method are noted. Detection of trace amounts of elements by electron diffraction (Tl and Pb in soot) is also discussed. (From Biological Abstracts 46:105998, 1965)

4056 Vinter, P. (Hosp. for Sick Children, Great Ormond St., London, England): THE ESTIMATION OF LEAD IN BLOOD. Journal of Medical Laboratory Technology 21:281-6 (Oct.), 1964.
A modification of a method for the determination of Pb in blood, developed by the Medical Research Council (1959), is described. Modifications include the use of a smaller quantity of blood for each estimation, the use of 0.5 ml concentrated sulfuric acid to minimize turbidity in the final solution, and raising the temperature of digestion.

Blood or urine is digested with an acid perchloric mixture and the resulting Pb salt is dissolved in an alkaline cyanide/citrate solution containing an excess of dithizone which chelates the Pb to a pink complex which is stable in the presence of cyanide at pH 8.4. The method has been used to determine Pb in blood in a group of healthy children; all except 2 of the values did not exceed 36 ug/100 ml.

4057 Weiss, D., and Fidler, J.: (OSCILLOPOLAROGRAPHIC DETERMINATION OF LOW QUANTITIES OF HEAVY METALS IN MINE WATER.) Rudy (Prague) 12, No. 6:204-5, 1964.
Detailed procedure is given for the oscillopolarographic determination of trace amounts (10^{-5}-10^{-6}M) of Pb, Cd, Cu, Ni, and Zn after separation of the individual elements by extraction or by ion exchange. The maximum relative error is 10% (av 6%). (From Chemical Abstracts 61:9292, 1964)

4058 Wöhlbier, W., and Oelschläger, W. (Agric. Coll., Hohenheim; Stuttgart, Germany): Die bei der Vorbereitung von Futtermitteln zur Mengen- und Spurenelementbestimmung möglichen Fehler. I. Mitteilung, II. Mitteilung. (POSSIBLE ERRORS THROUGH THE PREPARATION OF FEED FOR DETERMINATION OF MACRO- AND MICROELEMENTS. I-II.) Landwirtschaftliche Forschung 17, No. 1:47-52; 128-36, 1964.
I. Errors due to the collection, drying and ashing of feed samples for the determination of trace elements were discussed. Results are also affected by soil contamination. Furthermore, the ratio of trace elements differs in leaves and in stems of red clover; the respective Pb concentrations ar 0.98 and 0.79 mg Pb/100 g.

II. The effect of various ashing temperatures on the content of trace elements was investigated. Thus the Pb content after dry ashing at 450, 600, and 800°C, was respectively in mg/100 g: grass, 0.70, 0.68, 0.47; clover, 0.97, 0.86, 0.75; synthetic ashed hay, 0.49, 0.47, 0.35. Finally, different amounts of trace elements may be retained by the residual silicic acid; for Pb, these amount to 19% for dry-ashed grass and to 4% for wet-ashed grass.

4059 Wolstenholme, W.A. (Assoc. Elec. Ind. Ltd., Manchester, England): ANALYSIS OF DRIED BLOOD PLASMA BY SPARK SOURCE MASS SPECTROMETRY. Nature 203:1284-5 (Sept. 19), 1964.
The method of electrode preparation was that which has been used for insulating powders and is based on mixing pure graphite with the dried blood plasma directly, or after ignition of a known weight of the plasma. The graphite support matrix was also analyzed separately. Photoplates were calibrated using the $^{13}C^{+}$ line in the graphite blank spectrum and the concentrations of the elements were estimated by a visual method. Among the elements detected, Pb was 0.2 ppm weight. For the majority of elements detected, the results agree with known data to within a factor of 3.

4060 Yakovleva, G.K., Kvassova, N.B., and Stenin, N.S. (Podolsk Municipal and Regional Sanitary Epidemiol. Station): A SPECTRAL METHOD FOR DETERMINING LEAD IN THE AIR. Hygiene and Sanitation 29:128-9 (Dec.), 1964. Translation of Gigiena i Sanitariya 29:103 (Dec.), 1964.
A spectroscopic method for the determination of Pb in the air of workrooms and in the atmosphere was described. The average square error is ±10.1% for artificial solutions, ±14.5% for industrial tests and ±13.5% for atmospheric air. The sensitivity in the region of normal blackening is 1×10^{-5} to 5×10^{-5}% depending on the type of photographic plate used. Analysis of 10 tests requires 8 hr. The method can be used in sanitary epidemiological stations which have an ISP-28 spectrograph. (This is in the "Synopses and Reports" section of the journal, including only summaries.)

4061 Yoshimori, T., Kori, S. and Takeuchi, T. (Univ. Gifu, Japan): (MICROCOULOMETRY OF LEAD BY CATHODIC STRIPPING COULOMETRY.) Bunseki Kagaku 13, No.4:309-12, 1964.
Microquantities of Pb (0.05-1.0 ug in 10 ml solution) were determined by cathodic stripping coulometry. The method used was described. (From Chemical Abstracts 61:1258, 1964)

X. CHEMISTRY AND TECHNOLOGY

1951

4062 Plauein, R.: (LEAD COMPOUNDS, ALLOYS, OR PREPARATIONS CONTAINING THEM.) German patent 804, 806, Apr. 30, 1951.

The toxicity of Pb-containing compounds, alloys or preparations is considerably decreased by adding U salts or Ge oxides in traces during the manufacture of the Pb compounds. The additions effect an accelerated elimination of the formed Pb phosphate coupled on the red bone marrow and a prophylaxis against general virulent tumors, inhibit the formation of unnatural d-aminocarboxylic acids and activate the reticuloendothelial system; a valuable immunity is imparted against Pb intoxication. An addition of ~0.008% (based on the crude metal weight) Ge iodide or uranyl chloride to the melt of a Pb alloy or of 0.01-0.02% (based on the Pb weight) of a U salt or Ge oxide to the batch in the Pb pigment manufacture is sufficient. (From Chemical Abstracts 45:5601, 1951)

4063 Syavtsillo, S.V., and Danilina, A.F.: (PENETRATION OF WOOD BY TETRAETHYL LEAD.) Gigiena i Sanit. 1951, No. 7:49-50.

TEL penetrates rather rapidly into the surface layers of lumber but prolonged exposure does not appear to cause penetration beyond 0.5 cm if applied perpendicularly to the wood grain fibers. Application along the grain gives 8-10 times deeper penetration. Similar penetration is achieved by the vapor, especially at elevated temperature. Immersion of lumber samples into the fluid may cause as much as 98% by weight retention after 48-hr exposure. A 4-6-day exposure to normal outdoor conditions serves to remove the TEL that is retained by previous applications, but only from the vapor state; liquid treatment causes greater retention and complete "aeration" is impossible. Treatment with steam at 100° is effective only after 4-5 hr treatment. (From Chemical Abstracts 46:677, 1952)

1953

4064 Ligett, W.B., Closson, R.D., and Wolf, C. N.: N-ORGANOLEAD PHTHALIMIDES AS FUNGICIDES. U.S. Patent 2,640,006, May 26, 1953, to Ethyl Corp.

The preparation of certain N-organo-Pb phthalimides by reaction of a trialkyl or triaryl Pb hydroxide with a phthalimide is described. Suspensions containing 1 part of crystalline phthalimide containing 46.6% Pb or N-(triethyl-Pb)tetrachlorophthalimide in a million parts distilled water and 0.01 part Triton X-100 inhibited the germination of 50% of the spores of the fungi Alternaria oleracea and Sclerotinia tructicola, which are responsible for potato blight and peach rot, respectively. (From Chemical Abstracts 47: 8307, 1953)

4065 Roll, K.H. (Lead Ind. Assoc., New York, N.Y.): LEAD AND LEAD ALLOYS. Industrial and Engineering Chemistry 45:2210-4 (Oct.), 1953.

This review brings the last one, made 4 yr ago, up-to-date. It includes new books published, research progress made, corrosion data, engineering applications, and technological advancements. Bonded Pb has been accepted as a practical means of combining the corrosion resistance of Pb with the strength of steel. Pb-covered Cu similarly couples the electrical conductivity and greater heat transfer of Cu with the superior corrosion characteristics of Pb. New and more reliable methods of testing sheet Pb linings and Pb welds for imperfections have been put into practice along with a nondestructive method for detecting bond discontinuities in bonded Pb linings. Interest has been reawakened in the use of cage-type sheet Pb construction and in the combination of brick and Pb for high temperature, erosion-corrosion service. Installation of strapped sheet Pb lining has been speeded up by the perfection of automatic stud welding. The invention of an automatic Pb welding machine has contributed to further automation in the Pb fabricating industry. Pb and Pb alloys are playing an important role in the control of corrosive pollutants, including acids that would normally waste into streams and sulfurous gases and mists wasting into the atmosphere. (29 references)

1954

4066 Genta, V., and Ansaloni, A. (Univ. Modena, Italy): (ISOTOPIC EXCHANGE BETWEEN TETRAETHYLLEAD AND RADIOACTIVE METALLIC LEAD.) Gazz. Chim. Ital. 84:921-6, 1954.

Optimum conditions described for preparing small amounts of radioactive TEL of known specific radioactivity were accomplished by direct isotopic exchange between TEL and metallic Pb containing ^{210}Pb (RaD). Metallic Pb was prepared from an aqueous solution of Pb nitrate of known concentration by galvanic displacement with powdered Mg, the nitrate solution being "tagged" with ^{210}Pb so that it had a specific activity of 320 counts/sec/mg Pb when measured under fixed geometric conditions with a Geiger counter having a window of 1.5 mg/cm^2. The "tagged" Pb (~10 mg) was prepared directly in a Pyrex tube containing a thin glass ampul (~16 mg) of purified nonradioactive TEL, the tube then being sealed off in vacuo. Just before the start of the experiment the ampul was broken by centrifuging. (From Chemical Abstracts 49:5933, 1955)

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4067 Pamfilov, A.V., and Mikhailova, N.V. (State Univ., Chernovitsy, USSR): (THE OXIDATION OF LEAD OXIDE BY THE AIR. II.) Ukrain, Khim. Zhur. 20:236-42, 1954.

The oxidation by air of active Pb oxide preparations obtained from decomposition of white Pb was studied. The activity of the samples was increased greatly by pulverization, having a large effect for the samples with a rhombic structure, which was attributed to the increased rate of their polymorphic transition. Such factors as the state of the surface, the previous history of the sample, etc, often have a greater effect than does the crystalline structure of the rate of oxidation. (From Chemical Abstracts 50:3857, 1956)

4068 Roll, K.H. (Lead Ind. Assoc., New York, N.Y.): LEAD AND LEAD ALLOYS. Industrial and Engineering Chemistry 46:2088-91 (Oct.), 1954.

Noteworthy technical advancements have been made in the installation of Pb and the author reviews the research progress, engineering applications, technological advancements, new patents, and new publications of the past year. Physical and chemical properties of Pb and Pb alloys, particularly creep characteristics, have been determined. The effects of purity and additions of Sb, Sn, Cu, As, Bi, Zn, Mg, Ca, Te, Tl, and Ag on the creep characteristics of Pb were investigated. New engineering applications of bonded or clad Pb linings on steel and Cu are described. The performance of Pb equipment in the handling of liquid alum and other corrosives is covered along with some applications of Pb in modern architecture where resistance to atmospheric corrosion is paramount. Pb metallizing as a means of prolonging the service life of steel equipment exposed to sulfuric acid is described. The use of Pb for radiation protection is compared with other possible shielding materials. The technique of using a cartridge powered stud driver for anchoring sheet Pb and steel strapping to steel or concrete vessels has been put to practical use in the field resulting in substantially reduced sheet Pb lining erection cost. Corrosion performance and other characteristics of Pb-Sn alloy coated strip steel are described along with several patents facilitating the manufacture of bonded Pb-lined equipment, bonded Pb covered pipe, and the Pb coating of ferrous objects. (35 references)

1955

4069 Rabate, J.L.: (LEAD PIGMENTS IN THE BATTLE AGAINST CORROSION.) Peintures, Pigments, Vernis 31:776-86, 1955.

A description is given of the history, composition, use, and effectiveness of various Pb pigments (basic Pb carbonate, basic Pb chromate, red Pb, Pb molybdate, sulfate, aluminate, tungstate, titanate, phthalate, benzoate, phosphate, silicate, Pb cyanamide, and various plumbates) in the preparation of corrosion-resistant coatings. (From Chemical Abstracts 50:5305, 1956)

1956

4070 Lead Industries Association, Ceramic Technical Committee: LEAD IN THE CERAMIC INDUSTRIES. New York, 1956-. (Looseleaf)

As stated in the foreword, the manual has been prepared as a permanent record of the properties and applications of Pb compounds that may be helpful to the ceramist. The properties and Pb contents are presented and discussed in 12 sections: Properties imparted by Pb compounds to ceramic products; principal Pb compounds and their properties; glazes; glass; enamels; glass decorating colors; bodies; miscellaneous applications of Pb compounds and frits; dependability of future Pb supplies; materials handling; phase diagrams, and bibliography. Supplements have been issued periodically for the various sections.

4071 Schafer, E.H. (Univ. California, Berkeley, Calif.): EARLY USE OF LEAD PIGMENTS AND COSMETICS IN CHINA. T'oung Pao (Leiden) 44:413-38, 1956.

Metallurgy of Pb in China began in the Shang Dynasty (2nd millennium BC). Yellow massicot (unfused PbO) may have been used as a face paint in some early periods. Preparation of minium (red Pb) directly from metallic Pb was understood in Chou times. Minium was sometimes used in cosmetics. Ceruse (white Pb) was employed by the ancients much more than the Pb oxides. It is first mentioned in writings of the Han Dynasty (206 BC-222 AD). Ceruse has enjoyed continuous use as a cosmetic since Han times. (From Chemical Abstracts 51:7779, 1957)

1957

4072 Rochow, E.G., Hurd, D.T., and Lewis, R.N.: THE CHEMISTRY OF ORGANOMETALLIC COMPOUNDS. New York, John Wiley and Sons, Inc., 1957, pp. 190-7.

Preparation, chemical and physical properties are described. All organolead compounds are toxic but to different extents. Some representative alkyls, halogenated, and other derivatives are tabulated.

4073 Struble, R.W.: MATERIALS FOR HANDLING DEIONIZED WATER. Technical Memorandum No. 51. US Atomic Energy Commission Document No. NYO-7990, 1957, 16 pp.

A study was made to determine which materials should be used in the construction of a deionized water cooling system. Deionized water was found to be very similar to distilled water except for the organic content, which should have little effect on the conductivity of water except for the corrosion. The methods of corrosion are discussed.
The investigation is a compilation of recommendations for material for high-purity deionized water systems as recommended by manufacturers of deionizers and authoritative texts in the fields of corrosion and water systems. A galvanic series is given of some of the metals (including Pb) investigated. It was concluded that the most desirable metal for this use is Al, at a maximum temperature of 177°C, and wherever possible the system should be Al-clad. Glass or plastics are nonmetallic materials that are capable of handling deionized water without contaminating it. (From Nuclear Science Abstracts 15: Abstr. No. 13290, 1961)

1958

4074 Associated Electrical Industries Ltd. (Mount, W.A. and Walker, P., inventors): NONTOXIC PAINTS CONTAINING LEAD COMPOUNDS. British Patent 873,917, July 23, 1958.

A nontoxic paint is prepared by first forming a chelated compound of Pb and then incorporating it into an oleo-resinous paint vehicle. Fifty percent of Pb-di-Na ethylenediaminetetraacetate or di-Pb ethylenediaminetetraacetate is ground into a vehicle comprising a mixture of 50% linseed oil-modified alkyd resin, 0.5% Pb and 0.05% Co added as naphthenates, with the remainder being white spirit. (From Chemical Abstracts 56:564, 1962)

1959

4075 De Pree, D.O.: AMINOLEAD COMPOUNDS AS HERBICIDES. U.S. Patent 2,893,857, July 7, 1959.

Triethyllead (TrEL) was prepared by dissolving TrEL chloride in 10 times its weight of C_6H_6, mixing with a stoichiometric excess of Na secbutylamine, reflexing for 30 min and filtering off the NaCl precipitate, leaving a pale-yellow liquid which was recovered by evaporation on a steam bath. The herbicidal effect was due to the high Pb content of the hydroxide. (From Chemical Abstracts 53:18372, 1959)

4076 Rieche, A., and Dahlmann, J.: (ORGANIC GERMANIUM AND LEAD PEROXIDES.) Monatsber. Deut. Akad. Wiss. Berlin 1:491-3, 1959.

The following Pb compounds were made: triphenyl-(tert-butylperoxy)Pb, m 97-99°, triphenyl(cumylperoxy)Pb, m 113-115°, triphenyl(triphenylmethylperoxy)Pb, m 110-112°. The compounds hydrolyze readily, are stable at room temperature and decompose violently when rapidly heated. (From Chemical Abstracts 55:18640, 1961)

1960

4077 Charleston, R.J.: LEAD IN GLASS. Archaeometry 3:1-4, 1960.

The history of the use of Pb in glass through the centuries is reviewed.

4078 Furness, F.N., ed.: CHELATION PHENOMENA. Annals of the New York Academy of Sciences 88, Art. 2:281-532 (Aug. 18), 1960.

The monograph includes reactions of chelates with Pb. The chemistry of chelation and the biological, medical, and industrial significance of chelating agents are discussed.

4079 Kazantsev, A.A. (Technol. Inst. Light Ind., Moscow, USSR): (SOLUBILITY OF LEAD NITRATE IN WATER.) Zhur. Neorg. Khim. 5:1598-1600, 1960.

Values for the solubility of Pb nitrate in water, measured at 0-100°, are given. (From Chemical Abstracts 56:2943, 1962)

4080 Martell, A.E.: THE RELATIONSHIP OF CHEMICAL STRUCTURE TO METAL-BINDING ACTION. In Seven, M.J., and Johnson, L.A., ed.: Metal-Binding in Medicine. Philadelphia, Lippincott, 1960, pp. 1-18.

This review, including reactions of Pb(II) with EDTA and other chelates, based on 21 references, is summarized by the author as follows: There are 2 general ways to influence stability; (1) a relatively nonspecific one, and (2) an increase in specificity in favorable cases. The nonspecific effect, found generally in the entropy of reaction, is favored by increasing the positive charge of the metal ion, the negative charge of the ligand and the number of chelate rings. This effect is important in maintaining stability in very dilute solutions and for strong binding of the more basic metal ions. The other effect, which is reflected generally by enthalpy of reaction, increases with electronegativity of the metal and with the basicity of the ligand. It can be made to vary considerably by changing both the metal ion and the nature of the donor groups of the ligand. The attainment of relative specificity, or selectivity, depends largely on this effect and on steric factors.

1961

4081 Cooley, R.A., and Bruson, H.A.: NITROCELLULOSE PROPELLANTS CONTAINING LEAD SALTS OF ALIPHATIC ACID. U.S. Patent 2,982,638, 1961, to Olin Mathieson Chemical Corp.

Pb salt of alkoxy, keto or N-substituted amino acid such as butoxyacetic acid, N,N-bis (2-ethylhexyl)-p-amino propionic acid or 12-oxostearic acid 0.5-5.0% was added as a burning rate stabilizer into a nitrocellulose propellant, especially suitable for use in rockets and guided missiles. Pb butoxyacetate and Pb salts of 5 other acids similarly stabilized the burning rate range. (From Chemical Abstracts 55:17008, 1961)

4082 Goodacre, C.L. and Foord, D. (Associated Octel Co. Ltd., London, England): COMPARATIVE ANTI-KNOCK EFFECTS OF TETRAETHYL LEAD, TETRAMETHYL LEAD AND ADMIXTURES OF THESE MATERIALS AS ORGANO-LEAD ALKYLS. The Associated Octel Co. Ltd., Serial No. OP.61/4, Dec. 1961, 27 pp.

The physical properties and the effectiveness as antiknock agents in gasoline of TEL, TML and of mixed Pb alkyls are discussed.

4083 Greenwood, J.N. (Univ. Melborne, Australia): REFINING AND PHYSICAL PROPERTIES OF LEAD. Met. Revs. 6:279-351, 1961.

A review with 183 references. (From Chemical Abstracts 56:5739, 1962)

4084 Marcus, Y. (Atomic Energy Comm. Lab., Rehovoth, Israel): PARENT ACTIVITY FROM DAUGHTER GROWTH. Nucleonics 19:76 (Mar.), 1961.

A method is given for calculating the activity of a long-lived parent from the growth of a daughter with a short 1/2 life. In this method, the daughter activity is plotted vs time on one graph and compared with a calculated curve until the best fit is found. In this way, daughter equilibrium activity can be determined from data extending over little more than 1/2 life of the daughter, the moment of separation can be determined, and the daughter 1/2 life can by approximated by using a family of curves plotted with 1/2 life as a parameter. This method is applied to the growth of ^{210}Bi in a sample of initially pure ^{210}Pb. (From Nuclear Science Abstracts 15:Abstr. No. 12169, 1961)

4085 Saunders, G.W., and Bengston, M. (Queensland Dept. Agr. & Stock, Australia): PESTICIDE TAINT TRIALS IN TOBACCO. Queensland Journal of Agricultural Science 18: 497-9, 1961.

Taint trials (which must be carried out before recommending pesticides for use) during the period 1952-1961 showed that Pb arsenate used with DDT caused slight taints in 3 samples.

4086 Schmidbaur, H., and Schmidt, M.: METHYL-STANNO-SILOXANES AND METHYL-PLUMBO-SILOXANES. Journal of the American Chemical Society 83:2963-4 (July), 1961.

The synthesis and the properties of methylplumbosiloxanes are described. Hexamethylplumbosiloxane, $(CH_3)_3$ SiOPb $(Ch_3)_3$, is a colorless liquid of high vapor pressure, unexpected thermal stability and high sensitivity to water. It boils without decomposition at 172° under atmospheric pressure of dry N. At temperatures >150° the vapor reacts explosively with O under formation of elementary Pb. Under normal conditions the compound is stable against dry air and the influence of light. Methylplumbosiloxanes have an extremely unpleasant odor and are highly toxic because of their good solubility in organic solvents (and in the lipoid) and their sensitivity to hydrolysis.

1962

4087 Callaway, H.M. (Bur. Mines, Washington, D.C.): LEAD. A MATERIALS SURVEY. Washington, D.C., US Bureau of Mines, Information Circular 8083, 1962, 194 pp.

A compilation of data on Pb, pertinent to the evaluation of the civilian and military supply-demand positions, is presented. The following topics are discussed: Properties and uses of Pb; primary and secondary resources; Pb technology; supply and distribution; structure of Pb industry; employment and productivity in the Pb industry; research and development; legislation and government programs; strategic factors relating to Pb. Tables and diagrams on production, consumption, imports and exports, reserves and capacities are included.

4088 Garrett, A.B. (Ohio State Univ., Columbus): LEAD TETRAETHYL: THOMAS MIDGLEY, JR., T.A. BOYD, AND C.A. HOCHWALT. Journal of Chemical Education 39:414-15 (Aug.), 1962.

The history of the research which led to the discovery of TEL as an antiknock agent is summarized.

4089 Komarmy, J.M.: NORMAL LEAD STYPHNATE FOR EXPLOSIVES. U.S. Patent 3,041,361, June 26, 1962, to U.S. Navy.

The process for the production of normal Pb styphnate, which avoids use of large amounts of solvent and requires no crystallization agent, is described. (From Chemical Abstracts 57:14046, 1962)

4090 Turner, S.W., and Fader, S.A.: NEW USES FOR LEAD. Industrial and Engineering Chemistry 54:52-5 (Apr.), 1962.

The consumption of Pb in the US from 1951-61 is reviewed. The use of TEL increased from 127,500-166,000 tons, while the use of Pb house paints and cable sheathing decreased. New uses of Pb in the fields of sound and vibration, thermoelectricity, piezoelectricity, corrosion, ceramics, pigments and paints are discussed.

1963

4091 Feldhake, C.J. and Stevens, C.D. (Univ. Cincinnati, O.): THE SOLUBILITY OF TETRAETHYLLEAD IN WATER. Journal of Chemical and Engineering Data 8:196-7 (Apr.) 1963.

The solubility of TEL has been measured to aid in the understanding of the aqueous solubility of nonelectrolytes. Results are reported that indicate the magnitude of the solubility of TEL in water saturated with air. Two techniques, 1 for the separation of TEL from small volumes of air and 1 for its separation from small volumes of water were developed.

In the technique described, TEL vapor, water and air were equilibrated in all-glass apparatus. The phases were separated, the TEL extracted into pentane, and the pentane analyzed for Pb. In the separated phases, no decomposition products of TEL were noted. Between 0.2 and 0.3 mg TEL saturate a liter of water at 0-38°C.

4092 Goodacre, C.L., and Foord, D. (Associated Octel Co., Ltd., London, England): Bleialkyle als Antiklopfmittel für Autobenzin. (LEAD ALKYLS AS ANTIKNOCK AGENTS FOR MOTOR GASOLINE.) Acta Chimica Academiae Scientiarum Hungaricae 36, No. 1-4:235-53, 1963.

After a brief review of the role played by TEL in the gasoline industry, the possible competition by other compounds, some of the possible advantages and disadvantages involved in the application of certain Pb alkyls with higher volatilities than TEL are discussed. Results of knock measurements on C.F.R. engines and of road tests with various gasolines and cars are described. With some gasoline-car combinations certain advantages exist when Pb alkyls of a higher volatility than TEL are used. (From authors' summary)

4093 Maxwell, C.W., and Parsons, E.C. (Res. Station, Canada Dept. Agr., Fredericton, New Brunswick): COMPARING INERT INGREDIENTS IN LEAD ARSENATE SPRAYS IN LABORATORY TOXICITY TESTS AGAINST THE APPLE MAGGOT, RHAGOLETIS POMONELLA. Journal of Economic Entomology 56, No. 5:626-8, 1963.

The addition of 3 lb/100 gal of either hydrated lime, attaclay, continental clay, or Celatom MN-39 increased the toxicity rating of Pb arsenate sprays in laboratory spray residue tests against the apple maggot, Rhagoletis pomonella (Walsh). With the exception of Celatom MN-39, increasing the amounts of these inert ingredients to 6 lb caused reduction in toxicity ratings. A further increase of 9 lb of these inert ingredients resulted in toxicity ratings below that for Pb arsenate alone. Increases in toxicity ratings occurred with increases in the amounts of Celatom MN-39 used. Decreases in toxicity occurred when Pb arsenate was used in combination with Bordeaux mixtures. The addition of nicotine sulfate to Pb arsenate sprays showed little increase in toxicity but was much greater when hydrated lime was added. In combination with Bordeaux mixtures toxicity rating was somewhat less than when hydrated lime alone was used. There was some evidence that heavy residual sprays on apples deterred insects from alighting on such treated fruit. (From authors' summary)

4094 Moulds, D.E.: LEAD. In Minerals Yearbook, Prepared by Bureau of Mines, Washington, D.C., US Government Printing Office, 1963, Vol. 1, pp. 701-35.

Industrial requirements in the US for Pb in 1963 exceeded the supply from all sources although domestic output of recoverable Pb in ore increased to 253,400 tons and production of primary refined and antimonial Pb to 426,200 tons. Recovery of secondary Pb from scrap increased 11% above the 1962 level to 493,471 tons, but imports declined ~15% to 220,400 tons. Consumption of Pb was 5% above that of the previous year and amounted to 1,163,400 tons. Increased use was shown for all classes except sheet Pb and type metal. Gasoline antiknock additives registered a major gain and a record for this use at 192,800 tons of Pb. The two major end product uses of Pb, storage batteries and gasoline additives, combined, represented 54% of the total Pb consumed. Production of Pb pigments increased by 4% to 299,400 tons of Pb content. The quoted New York price for common Pb increased from 10-12.50 cents by November 1963.

In world mine and smelter production, and consumption, the upward trend also continued during 1963: Mine production was an estimated 2.8 million short tons and smelter production slightly lower; free world consumption was 2.23 million tons of primary Pb; producer stocks declined from 289,300 tons at the beginning of the year to 165,600 tons at yearend. Japan, France and Italy increased imports over 1962, while United Kingdom decreased them slightly and West Germany did so significantly. The exports of Belgium, Luxembourg and of the USSR increased, while those of France, West Germany, Canada, and Australia were reduced.

The program of research and investigation initiated by the Lead Industries Association and the American Zinc Institute continued to produce expanded information of the basic characteristics of Pb and the application of Pb metal and its alloys. US patents were issued relating to commercial techniques for producing a purified metal from the sulfide, for preparing Pb azide, for producing battery paste and for a high-temperature treatment of Pb-Sb alloy.

4095 Stainer, H.M.: X-RAY MASS ABSORPTION COEFFICIENTS. A LITERATURE SURVEY. US Bureau of Mines, Information Circular 8166, 1963, 124 pp.

Published X-ray mass absorption coefficients were compiled and tabulated for 87 elements, including Pb.

1964

4096 Anderson, E.C., Dean, P.N., and Rose, M. W.: CONTAMINATION OF MATERIALS OF CONSTRUCTION. US Atomic Energy Commission Document No. LA-3132-MS, 1964, pp. 145-52.

In collaboration with the National Academy of Sciences-National Research Council's Subcommittee on Low Level Contamination of Materials and Reagents, the authors investigated the γ contamination of Pb and steel. Eight samples of Pb sheet prepared from ores from different localities were compared with 2 reference samples. The reference samples gave identical gross spectra which were not significantly different from those of Pb samples derived from ores from Missouri, southern Illinois, Mexico and Australia, estimated to have <2 nCi ^{210}Pb/kg, while 4 of the commercial samples, derived from ores from Nebraska, Peru, Utah and Canada, showed ^{210}Pb contamination ranging from 40-10 nCi/kg. In steel, contamination by ^{106}Ru was found which was ~2 orders of magnitude lower than that of ^{210}Pb in Pb ore.

As discussed by Rutherford et al (1930), Ra present in the Pb ore will remain. Due to decay of the isotope, old Pb is usually much less active than new Pb; however, since clean commercial Pb is available, its use for low-level shielding material seems to be more economical.

4097 Bag, S.P., Fernando, Q., and Freiser, H. (Univ. Arizona, Tucson): FORMATION CONSTANTS OF CERTAIN METAL COMPLEXES OF THIOGUANINE. Archives of Biochemistry and Biophysics 106:379-80 (July 20), 1964.

The acid dissociation constants of 2-amino-6-mercaptopurine and the formation constants of its metal chelates with bivalent Pb, Zn, Ni, Co and Mn in 50% (by volume) aqueous dioxane were determined and compared with chelate formation constants that have been reported for other substituted purines.

4098 Caley, E.R., and Easby, D.T., Jr. (Ohio State Univ., Columbus): A LEAD LIP PLUG FROM WESTERN MEXICO. American Antiquity 29:497-500 (Apr.), 1964.

A corroded white-metal lip plug from Guerrero was shown by wet-chemical and spectrographic analyses to have originally contained over 99% Pb. After reviewing 16th-century eyewitness accounts, linguistic evidence, the mineral resources of Mexico, the technological problems involved in the primitive extraction of Pb from its most common ore, galena, and the few early Pb artifacts reported from Mexico, the authors believe that the smelting of Pb ore and use of metallic Pb were known before the arrival of the Spaniards and that there is no valid reason to doubt that this object was made before the Conquest.

4099 Doornbos, D.A., and Faber, J.S. (Univ. Groningen, Holland): STUDIES ON METAL COMPLEXES OF DRUGS; D-PENICILLAMINE AND N-ACETYL-D-PENICILLAMINE. Pharmaceutisch Weekblad 99:289-309 (Mar. 20), 1964.

The complexing ability of two chelating agents, D-penicillamine and N-acetyl-D-penicillamine, which are used in the treatment of Pb poisoning, was studied and their behavior was compared with that of L-cysteine. Under the experimental conditions, L-cysteine and D-penicillamine gave stable 1:1 and 2:1 complexes with Mn, Fe, Co, Ni, Zn, Hg and Pb. The spreading factor between the stability constants K_1 and K_2 was small, except with Pb. The stability constants (K_1, K_2 and B_2) were calculated on a computer (ZEBRA) with a least-squares method. N-acetyl-D-penicillamine also gave stable 2:1 complexes. As the calculated spreading factor is small and $K_2 > K_1$, only B_2 is reliable; therefore, the 1:1-complex can exist only in a small concentration range.

The order of stability constants of the complexes formed by metals with L-cysteine was: $Hg^{II} > Pb > Ni > Zn > Co^{II} > Fe^{II} > Mn^{II}$, with D-penicillamine: $Hg^{II} > Pb > Ni > Zn > Co^{II} > Fe^{II} > Mn^{II}$; with N-acetyl-D-penicillamine: $Hg^{II} > Pb > Cd > Zn > Ni \gtrless Co^{II} > Fe^{II} > Mn$. With each metal studied the stability constant of the complex of D-penicillamine was larger than that of L-cysteine; the stability constant of N-acetyl-D-penicillamine was much smaller. (From authors' summary)

4100 Feldhake, C.J., and Stevens, C.D. (Univ. Cincinnati, Ohio): ORGANOLEAD COMPOUNDS CONTAINING THE SULFONAMIDO GROUP. Journal of Chemical and Engineering Data 9:241-2 (Apr.), 1964.

The preparation of triphenyllead (N,N-diethylbenzene) sulfonamide and triphenylleadbenzenesulfonanilide was described. The former was obtained in 45% yield by reacting p-lithio-N,N-diethylbenzenesulfonamide with triphenyllead chloride and in 30% yield - though the reaction did not always occur - from triphenylleadlithium and p-iodo-N,N-diethylbenzenesulfonamide. The 2nd compound could be prepared only by coupling p-lithio-N-lithio-N-phenylbenzenesulfonamide with triphenyllead chloride, in a yield of 43%.

4101 Lenz, G.R., and Martell, A.E. (Illinois Inst. Technol., Chicago): METAL CHELATES OF SOME SULFUR-CONTAINING AMINO ACIDS. Biochemistry 3:745-50 (June), 1964.

Acid-dissociation constants of DL-methionine, S-methyl-L-cysteine, DL-ethionine, L-cysteine, and DL-penicillamine and the chelate-stability constants with a number of heavy metals, among them bivalent Pb, are reported for 25° and 0.10M ionic strength.

The finding that Pb (II) and Hg (II) form 1:1 chelates of exceptional stability, with penicillamine, shows why the ligand is effective as an antidote for Pb and Hg poisoning. In these chelates the ligand binds 3 of 4 coordinating positions to form a stable soluble metal complex which stays in solution over the entire range studied (pH 2-11).

4102 Lenz, G.R. and Martell, A.E. (Illinois Inst. of Technol., Chicago): METAL COMPLEXES OF CARNOSINE. Biochemistry 3:750-3 (June), 1964.

Stability constants of complexes formed by carnosine and 12 metal ions including Pb were determined.

4103 Ziegfeld, R.L. (Lead Industries Assoc., Inc., New York): IMPORTANCE AND USES OF LEAD. Archives of Environmental Health 8:202-12 (Feb.), 1964.

After a brief discussion of the mining, smelting and refining of Pb, the consumption of Pb in 1962 is reviewed by first enumerating the variety of products in the manufacture of which it is used. The industries which employ Pb include the following: storage battery, petroleum, cable, construction, paint (and color manufacture), ceramic, ammunition, printing, railroad, automobile; other uses are as insecticide, solders, coatings for metals, stabilizer for plastics, radiation shielding, for the control of noise and vibration. The consumption of Pb in 1962 totaled >1,075,000 tons and has averaged a little <1,100,000 tons/yr in the past 10 yr.

AUTHOR INDEX

The numbers following the author's name are the abstract numbers. Asterisks preceding numbers indicate principal authorship. All names preceded by "de," "van," "von," etc., are listed under the capitalized prefix. Where umlauts occur, the listing assumes the full combination of "ae," "oe," etc. "Mc" is considered as "Mac," and is listed in that sequence. Entries under "Anonymous," "Editorial," "Questions," etc., name the journal in which the article appears.

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